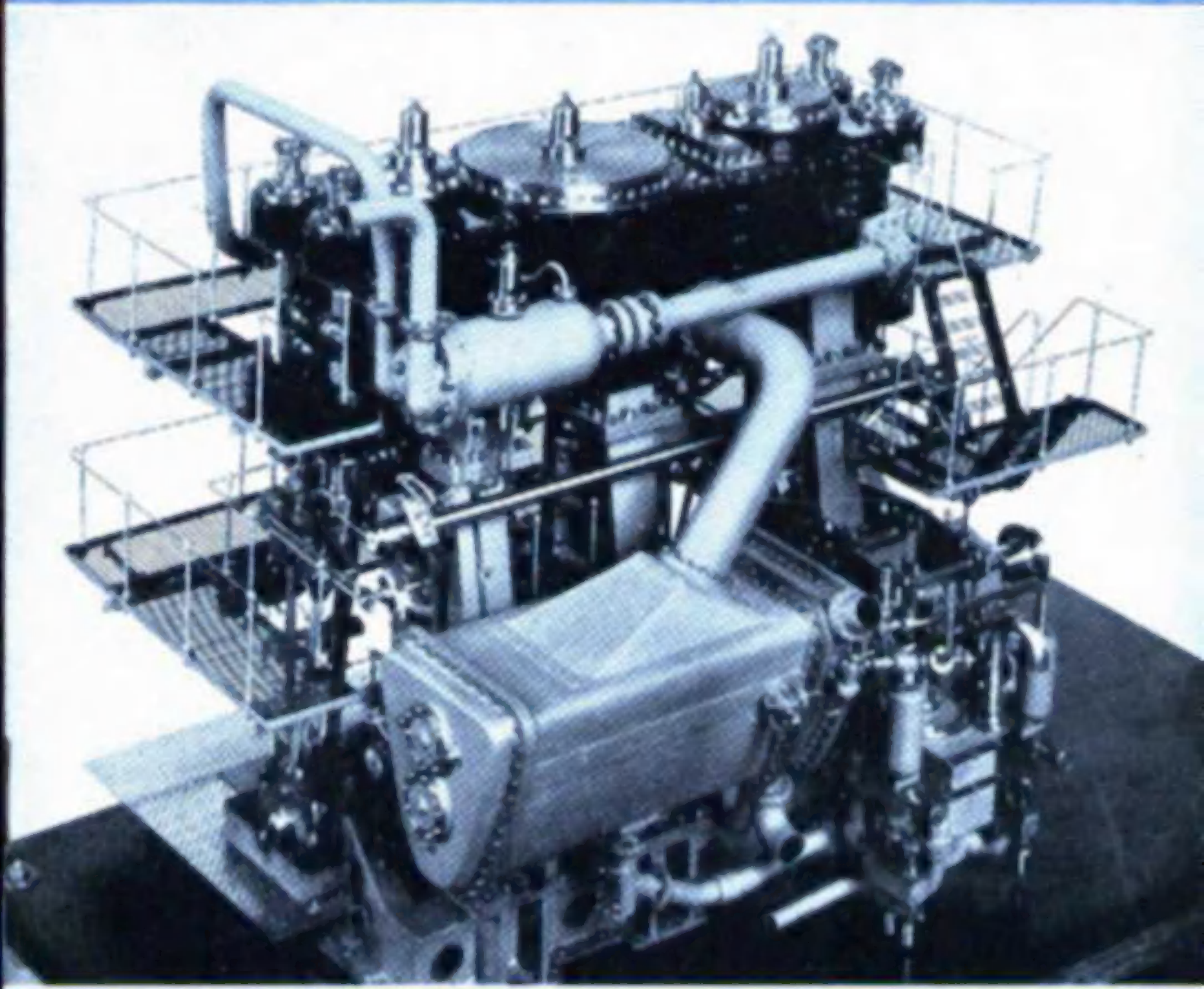
THE MODEL ENGINEER



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THE MODEL ENGINEER

EVERY THURSDAY

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Our Cover Picture

On the cover of the July 16th issue of the "M.E." we published a photograph of the triple-expansion marine engine built by Mr. W. T. Barker, of the London S.M.E.E. We make no apologies for publishing another view of this engine, as it is certainly one of the most outstanding mechanical models ever built by an amateur constructor, and a striking representation of the high-power reciprocating steam engine in its most up-to-date form. Mr. Barker exhibited this engine on the S.M.E.E. stand at the "M.E." Exhibition, where it was mounted on a swivelling turntable to facilitate inspection. Although complete in essential working detail, it is not proposed ever to run the engine under steam, or even compressed air, owing to the difficulty in keeping it clean; it is rotated at slow speed from a motor in the base, with suitable reduction gear, the drive being ingeniously concealed in the thrust block. Two other very fine model marine engines by Mr. Barker, of the side lever and oscillating type, for driving paddle wheels were also shown on this stand.

SMOKE RINGS

The Passing of the Barrel Organ

THE SO-CALLED "barrel organ" or "piano organ" which has for over half a century provided exhilarating, if not always harmonious, music in the streets, is rapidly becoming extinct, and the recent death of one of the most celebrated makers of these instruments makes it unlikely that they will ever be manufactured again on a large scale. We learn from a letter in *The Times* that a barrel-organ "hospital" has been set up at Lawshall Rectory, Bury-St.-Edmonds, by the Rev. A. O. Wintle, for rebuilding and refurnishing the organs, but nevertheless, this can only secure their respite for a few years, and after that they are liable to be lost and forgotten.

Model engineers have rescued from oblivion many interesting devices of the past, we wonder whether any of them have ever tried making a scale model of a barrel organ ? In view of the interest which has been shown in musical boxes and similar mechanical devices which have been used for making music in the past, one would logically expect to encounter some enthusiasm in respect of barrel organs as well. Yet apart from toys, or "dummy" models which have been used as properties or accessories in street scenes for puppet theatres and similar purposes, the possibilities in this direction seem to have been neglected. We should be interested to hear of the existence of a working model of any type of street organ, but particularly the familiar "piano organ" which has been employed to aid innumerable "deserving causes"—and possibly a few undeserving ones as well.

A Technical Assistant Wanted

WE LEARN from the School Authorities at the Royal Air Force Technical Training Establishment at Halton, Bucks, that a vacancy exists for the post of assistant at the school laboratory. The qualifications required include both theoretical and practical knowledge of mechanics and electricity, and ability in setting up and maintaining apparatus for experimental instruction. Preference is given to a man of about 25 years of age, but consideration will also be given to younger applicants if suitably qualified. The work is interesting and varied, with opportunities of advancement and establishment under the Civil Service scheme. Applications should be made to the Officer in Charge of Civilian Administration, Royal Air Force, Halton, near Aylesbury, Bucks.

Can You Help Us ?

IN PRE-WAR years, we possessed what we believe was a complete list of names and addresses of the winners of Championship cups, silver and bronze medals in THE MODEL ENGINEER Exhibition competitions. During the war this interesting and valuable record was lost. For some time, we have been endeavouring to re-compile it; but there are many blanks in the list and, in spite of careful research, we have not been very successful, so far, in discovering the information. In these circumstances, we have decided to solicit the help of older readers of the "M.E."; hence this appeal.

We appreciate the fact that some of the earlier prize winners are deceased; but their models must still exist, and in these cases, we would like to know who are the present owners. Therefore, will all readers who have won Championship cups or medals, or who know the present whereabouts of any models that have won such distinctions at past MODEL ENGINEER Exhibitions, be so kind as to advise us ? The information should be sent to the Exhibition Manager, c/o THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.

SOUTHAMPTON EXHIBITION

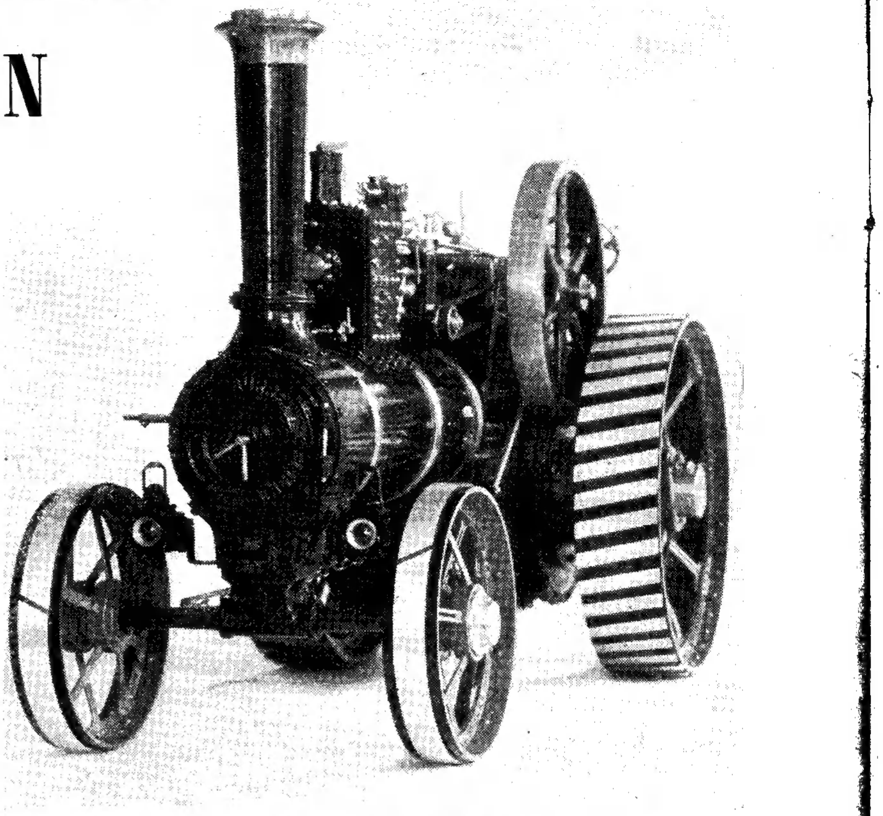
THE recent model engineering show at Southampton left no one in any doubt that the locality houses many a keen model maker. Over 180 models were entered and, once again, the Southern Federation of Model Engineers assisted with a fine array of models from Andover, Chichester, Portsmouth, Salisbury, Totton and New Forest, and the Isle of Wight.

Record Crowds

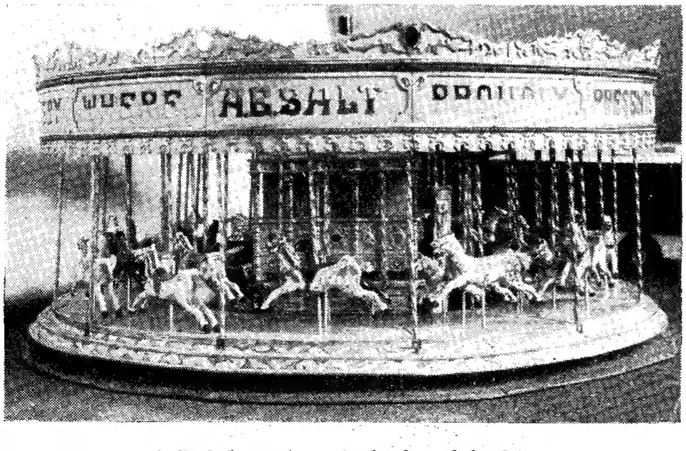
Mr. C. F. Carr, the society's president, opened the exhibition, and said that these shows were becoming something of an institution in Southampton. This was certainly borne out, as record crowds visited the show, and at one time things became so congested that closing of the doors became imminent.

No less than five McNarry models: H.M.S. *Prince*, a 40-gun frigate and *Caronia* by " Mr.," and *Comet* and a Cornish smugglers' lugger by " Mrs."—were one of the main highlights of the show; these 50-ft. to-the-inch models amazed everyone. This exhibit was awarded the Visitor's Cup.

A " Model Engineer " flavour was lent by Mr. Salt's (Southampton) scale model roundabout, not quite finished as yet, as was evident by the fact that some of the horses had tails whilst others were still awaiting them ! Mr. Salt also had on show, all the trailers for transporting the roundabout.



One of the show's highlights—Mr. E. W. Balson's " Burrel "



A. E. Salt presents all the fun of the fair

A goliath in comparison with the miniatures was Mr. Jennings' (Andover) trawler *Wanderer*. One's only criticism of this radio-controlled boat—which had recently shown its paces at the Southampton Regatta —was that it was a little *too* tidy and orderly for a trawler ! Mr. Jennings received the Admiral Sir Reginald Bacon Trophy for this fine model.

An example of the very popular M.T.B. type was Mr. Halliwell's (Bishop's Waltham) Vosper Series I. Quite a nice boat, and nicely painted, it earned a well-merited Diploma, as did Mr. Finmore's (Southampton) coal-fired *Diana*. This boat looks as well as it performs.

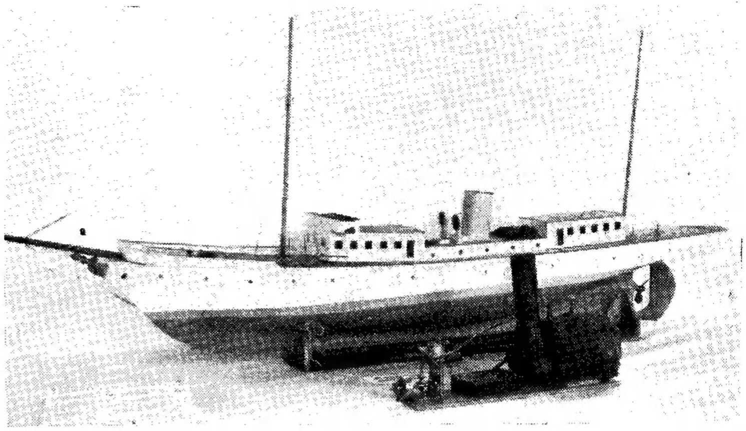
Very similar in external appearance was Mr. Washbourn's (Eastleigh) 4-ft. cabin cruiser—a radio-controlled job, and also another Diploma winner. Last year's Bacon Cup winner, Mr. Owen (Southampton) had an unfinished $\frac{1}{16}$-in.-to-the-foot model of the *Caronia* on show. Dead to scale, and with plenty of

detail, it should be a fine job when finished. Mr. Dicker's (Southampton) P. S. *Shanklin*—still incomplete—was the lone paddler. Come on, Joe, a good job like that is worth finishing !

Mr. Graseman, of Itchenor, displayed his Hampton Train Ferry, a nicely-made miniature of about 7 in. long. A smell of tar, canvas, and salt spray was conjured up by Mr. Gregory's (I.O.W.) ⅛-in.-to-the-foot model of the barque *Fantome II*.

Mr. Peckham (Southampton) had a pre-war built model of an early type of destroyer, and a steam-yacht on show, the latter surrounded by some very realistic photographs. He is rather a "one man band" and has enough models to put on a show all by himself.

The same could be said of the Southampton Society's oldest member, "Pop" Cannon, who will be 76 next birthday, and who is still going strong. His contribution was *six* locomotives, *two* traction engines, and *six* stationary engines all buzzing away on the compressed-air line ! He received a special prize, and another, equally welcome, but completely unscheduled, from Miss Rita Finmore, who presented the prizes !



One of Southampton's veterans—Mr. V. Mitchell's "Lady Mary"

A Cup Winner

The Locomotive Cup was awarded to Mr. Balson (Southampton), whose fine, "Light Devonshire" traction engine was greatly admired. Mr. Thomas's (Totton & New Forest) unfinished chassis for *Hielan' Lassie* would grace any model show. Alongside was another, almost complete *Lassie*, by Mr. T. Stallwood (Southampton) who actually started model engineering after he had retired, from an occupation quite unconnected with any form of engineering. He is now 74 years of age, and his locomotive is a very creditable effort.

The Peridot Cup, for miscellaneous working models, was won by Mr. D. F. Richards, whose mill engine proved just what could be done with a set of Stuart 10H castings.

Junior Work

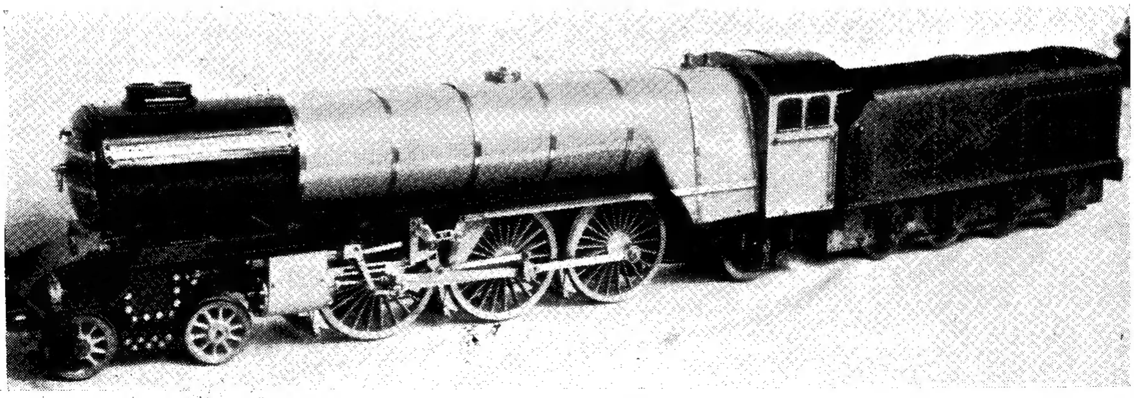
Among the many junior exhibits, the free-lance motor cruiser *Red Pirate* was a fine effort by 15-year-old B. G. Palmer (Southampton) and quite neatly finished in cream and blue—hardly the colours that its name would suggest !

A rather unusual model, by Mr. Moth (Southampton) was of a marker buoy, which flashed its warning signal throughout the show. Mr. K. Kittow, another Southampton junior, had on show a model tug. The hull of this craft was nicely made, and with a little more finish on paintwork and details, will make a fine model.

Compared with the previous show, only a few model aircraft were on view, the reason being that most of them were still tied up by the competition season, but the ones that were present were mostly good examples. Fourteen-year-old N. O. Worley's uncovered glider frame was nice and workmanlike.

Mr. N. F. Chandler, of Portsmouth, won the cup for model race cars, with a well-made and extremely compact job.

In general, this was a highly successful and very representative exhibition, which served to reflect the advancement made by the local society in the last few years.



Seventy-four year old Mr. T. Stallwood's "Heilan' Lassie"

L.B.S.C.'s "Britannia" in 3½ in. Gauge

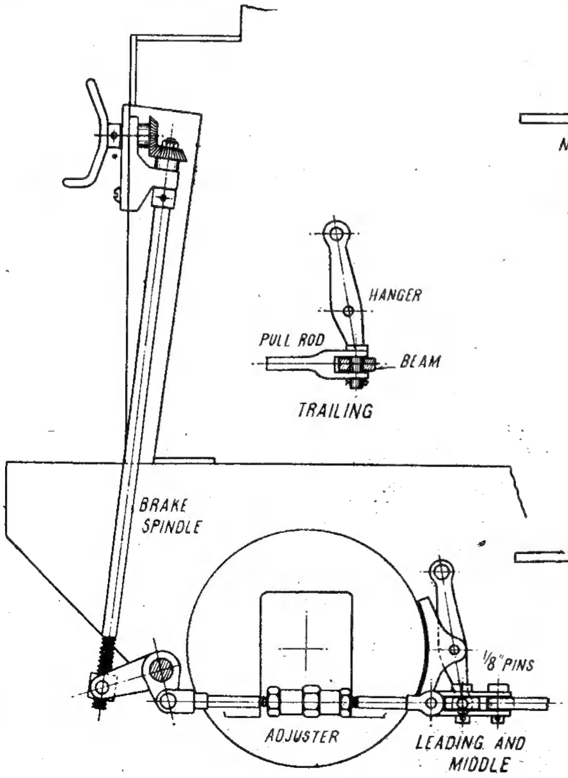
● CONSTRUCTING THE TENDER BRAKE GEAR

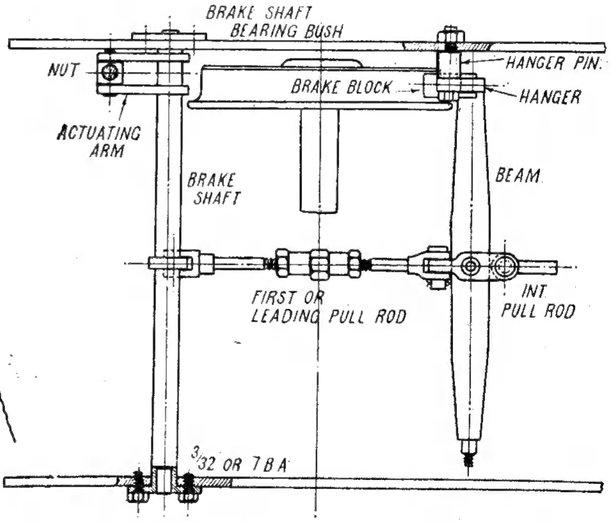
THE tender brake gear described below, while following the principles of the full-size job, differs in details, for the same reasons as sundry details on the engine. In full-size, the tender brakes are operated by a steam cylinder, same as on the engine, and worked from the same brake valve; the hand-brake attachment is virtually only for what our motor friends would call "parking." There is an extra arm on the brake shaft, connected to a bevel-geared apparatus by slotted links, and operated by a horizontal shaft with a brake handle of the usual type. No compensating gear is fitted to the actual rigging, but adjustment is provided on the first pair of pull-rods; there are two sets of pull-rods, one at either side, as the water-scoop prevents the use of one centrally-disposed set. The brake-hangers are supported by hefty pins attached to triangular-shaped plates, bolted to the inside of the frames.

On the small tender, we can dispense with the steam apparatus right away, as it is neither of use nor an ornament. This simplifies the arrangement of the cross-shaft, no separate brackets being necessary. The absence of a water-scoop allows a single central set of pull-rods and further simplifies matters. The connection between the gear-wheels and the brake nut, can be just a simple spindle, instead of separate links; there is even no need to slot the arms at each side of the nut, because there is sufficient spring in the long spindle, to compensate for the difference of the line of movement caused by the ends of the arms moving in an arc. The complete layout is shown in the accompanying drawings, and builders can see at a glance, how much I have simplified it; but even so, it is still more complicated than *Tugboat Annie's*—nuff sed !

Brake Handle and Bevel Gearing

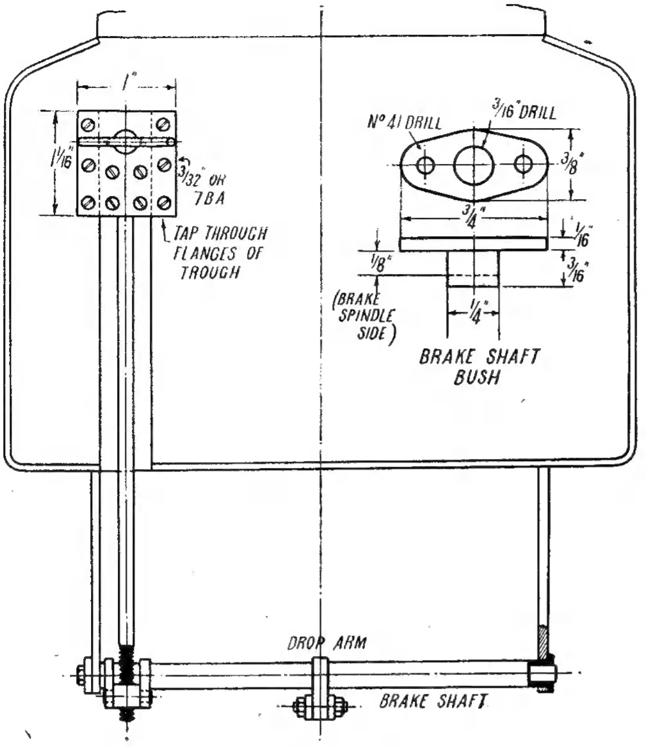
The sectional illustration shows the handle, gears, brackets and spindle, as one unit, which can be attached to the front plate of the tender, by six screws; it is easy enough to make up. Our approved advertisers may be able to supply a casting for the carrying-plate and bracket, in one piece; if so, all it will need in the way of machining, is a clean-up with a file, and the holes drilled for the screws and spindles. To build it up, cut a piece of 3/32-in. sheet steel or brass, measuring $1\frac{1}{16}$ in. × 1 in. and see that it is quite flat. The bracket will need a block of brass, of $\frac{7}{16}$ in. × $\frac{9}{16}$ in. section, and 1 in. long. This is milled, or sawn and filed, to the shape shown in section and plan. If you can get a pair of bevel wheels





Part plan of "Britannia's" brake gear, leading end

Left—Sketch showing the tender brake operating gear erected

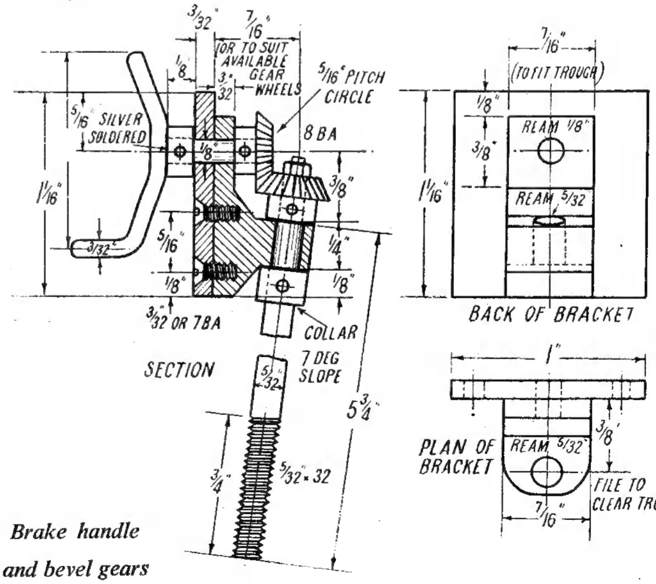


How brake shaft is erected

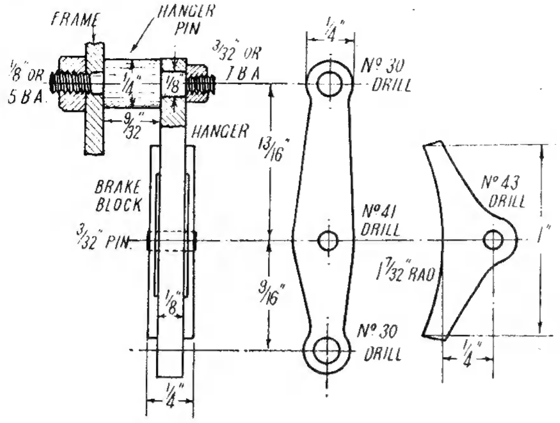
of the size shown in the drawing, drill a No. 23 hole at the point shown in the plan, and ream it 5/32 in. for the brake spindle. Be careful to get the angle correct; the easiest way would be to hold it in a machine-vice on the table of the drilling-machine, adjusting the carrying-plate to an angle-gauge set over to a 7-deg. slope. If a regular angle-gauge isn't available, one can easily be improvised from nothing more formidable than a bit of cardboard measuring about 3 in. × 2 in. Cut it to a perfect rectangle first, by aid of a try-square, and then cut one of the longer edges to the same angle as shown for the brake spindle in the drawing. Simple enough, surely, as you can measure the angle from the drawing. In the late 1880s, a certain enterprising kid with a mop of long golden curls, would have put a bit of tissue paper over the drawing, traced one of the vertical lines, also the centre-line running through the middle of the brake spindle, stuck it on a bit of tin cut from a coffee-tin and flattened out, cut it to the outline with the old pair of domestic scissors which did duty as snips, and called it an angle-gauge !

Drill the six holes through the carrying-plate, for the screws to attach it to the tender front, then mark off the position of the shaft carrying the brake handle, on the centre-line of the plate, at $\frac{5}{16}$ in. from the top. Note:—If the gear-wheels available, are of a different size from those shown, this hole must be drilled to suit, so that the wheels will mesh properly. Drill the hole No. 34, and ream it $\frac{1}{8}$ in. The spindle is a piece of silver-steel rod, $\frac{1}{8}$ in. diameter, and approximately $\frac{1}{2}$ in. long, one of the gears being pinned to it as shown, or it may be silver-soldered, as desired.

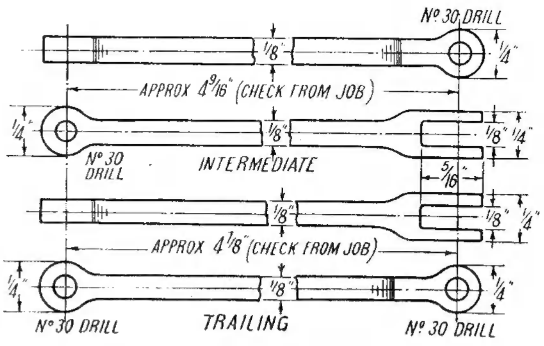
The brake handle is a piece of 3/32-in. mild-steel rod, bent to the shape shown, and the ends rounded off. The boss is a $\frac{1}{8}$-in. slice of $\frac{1}{4}$-in. mild-steel rod, with a No. 32 hole drilled through it. File a very shallow groove across the top, tie the handle to it with a bit of thin iron binding-wire, and braze or silver-solder the handle to the boss. Clean up, file off any surplus brazing material, push the spindle, with gear-wheel attached, through the bearing-hole from the back, and put on the handle. The spindle should turn freely without any end-play; if there is any, shorten the spindle a little, and when O.K. pin the boss of the handle to the spindle with a bit of steel wire, as shown. An alternative way would be, to turn the boss and spindle from a bit of $\frac{1}{4}$-in. mild-steel rod, attaching the handle to the boss as above; then drill and ream the boss of the gear-wheel to suit the spindle, push the spindle through the hole in the bracket from the front, put on the gear-wheel, and pin through the boss, taking the same strict caution as before, regarding the amount of end-play.



Brake handle and bevel gears



Brake blocks and hangers



Details of pull-rods

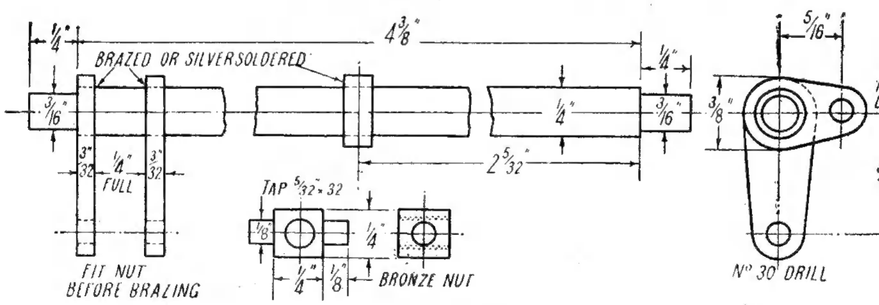
The long spindle is a piece of 5/32-in. round mild-steel or silver-steel rod, 6 in. long. Screw about $\frac{3}{4}$ in. of one end 5/32 in. × 32, for the brake nut. Turn down $\frac{1}{4}$ in. of the other end to $\frac{1}{8}$ in. diameter, then further reduce the end to a bare 3/32 in. leaving enough of the $\frac{1}{8}$ in. "plain," to suit the gear-wheel, which should be drilled $\frac{1}{8}$ in. to suit. Screw the reduced part 8 B.A., then hold the gear-wheel in place above the bearing-hole in the bracket, in correct mesh with the other wheel on the horizontal spindle. Push the reduced end of the long spindle through both bracket and wheel boss, and secure the wheel with an 8-B.A. nut. To keep the wheels in correct mesh, and prevent the spindle lifting when releasing the brake, make a collar from a $\frac{3}{16}$-in. slice of $\frac{1}{4}$-in. round rod, drilled 5/32 in. and pin it to the spindle under the bracket, in the position shown. The whole doings should work sweetly, without backlash, when the handle is turned. To prevent the gear-wheel slipping around on the long spindle, it can either be pinned as shown, or a $\frac{1}{16}$-in. round key fitted in the boss, in the same way as coupled wheels are keyed to the axles. The nut will prevent the key coming out.

The complete assembly can now be attached to the tender front by six 3/32-in. or 7-B.A. brass screws as shown, the bracket and gear being fitted into the trough, and the screwholes being tapped through the flanges at each side, which gives more hold for the threads. Anoint the latter with plumbers' jointing, as the screws go through into the water space at one side.

Brake Shaft

The brake shaft is made from 5 in. of $\frac{1}{4}$-in. round mild-steel. Chuck in the three-jaw, face off the end, and turn down $\frac{1}{4}$ in. length to $\frac{3}{16}$ in. diameter; reverse in chuck and repeat operation, leaving $4\frac{3}{8}$ in. between the shoulders. The actuating arms or levers are milled or filed up from 3/32-in. × $\frac{3}{8}$-in. flat mild-steel, and drilled No. 30 at $\frac{5}{8}$ in. centres; open out and ream the holes at the larger end, to a tight fit on the shaft. The drop arm is made from $\frac{1}{8}$-in. × $\frac{3}{8}$-in. mild-steel, shaped, drilled, and reamed as above; this can be put on the shaft right away, in the position shown. To make the nut, chuck a piece of $\frac{1}{4}$-in. square bronze rod truly in the four-jaw, face the end, and turn a $\frac{1}{8}$-in. pip $\frac{1}{8}$ in. long on it. Part off at $\frac{3}{8}$ in. from the shoulder, reverse in chuck, and turn another similar pip. Centre the facet between the pips, drill No. 30, and tap 5/32 in. × 32 to match the thread on the brake spindle.

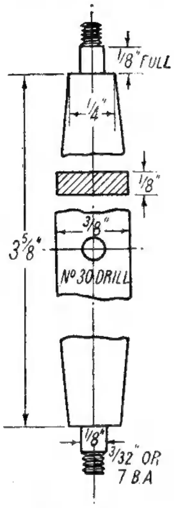
Press one of the longer arms on the shaft, setting it at 11/32 in. from the end; then press on the other arm flush with shoulder, putting the nut between, with the pips in the holes in the ends of the arms. These two arms should be exactly parallel with each other, and at right-angles to the drop arm. Braze or silver-solder all three to the shaft, at one heat. If our advertisers don't supply castings for the bearing bushes, they can be turned up from $\frac{3}{8}$-in. round bronze rod. Chuck in three-jaw, face, centre, drill to about $\frac{5}{8}$ in. depth with $\frac{3}{16}$-in. drill, turn $\frac{3}{16}$ in. of the outside to $\frac{1}{4}$ in. diameter, making them a tight push fit for the



Details of brake shaft

holes in the tender frame; part off to leave a $\frac{1}{16}$-in. flange. Repeat operation, but make the reduced part of the second one, only $\frac{1}{8}$ in. long. File the flanges oval, and drill the screwholes.

Put the brake shaft up in place, inserting between frames, which will be found easy, as the ends are smaller than the holes in the frames. Screw the brake spindle about halfway through the nut. Push in the bearing bushes from the outside, on



Brake beam

to the reduced ends of the brake shaft, setting the oval flanges horizontal; the shorter bush goes next to the brake arms. Run a No. 41 drill through the holes in the flanges, making countersinks on the frame; follow through with No. 48 drill, tap 3/32 in. or 7 B.A., and put hexagon-head screws in, as shown in the plan of partly-assembled gear.

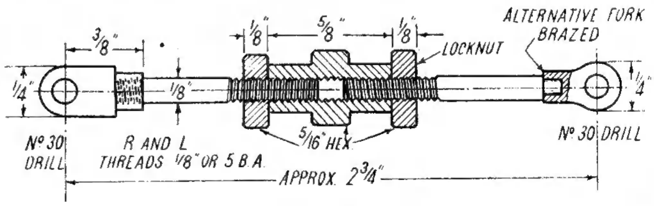
Brake Rigging

The hangers are filed up from $\frac{1}{8}$-in. × $\frac{3}{8}$-in. flat mild-steel, and drilled as shown. Our advertisers supply cast-iron brake-blocks, which only need cleaning up with a file, and drilling for pins; they are pinned to the hangers by bits of 3/32-in. steel, and should be just slack enough to allow them to bed closely to the wheel treads when brakes are applied, yet tight enough to "stay put" when the brakes are released, to avoid rubbing on the wheel treads when the engine is running. If anybody would rather cut their own brake blocks from solid steel, they can do so, by following the instructions given in the *Tich* serial. When writing about brake blocks, I often chuckle at the thought that as they are rough unmachined castings on full-sized locomotives, the efforts of the "paint-and-polish-brigade" on small brake blocks, would NOT gain a medal from Inspector Meticulous.

The hanger pins, which are just plain turning jobs, are made from $\frac{1}{4}$-in. round mild-steel, to the dimension shown. Leave the $\frac{1}{8}$ in. of plain part next to the shoulder, just long enough to allow the hanger to swing, when the nut is right home against the shoulder. Assemble as shown in the illustration, then poke the longer screwed spigot through the holes in the frame from the inside, and put nuts on the outside, but don't tighten them permanently yet, until the beams are fitted. These are $4\frac{1}{4}$ in. lengths of $\frac{1}{8}$-in. × $\frac{3}{8}$-in. mild-steel; chuck truly in the four-jaw, and turn and screw the ends as shown. File them taper towards each end, then put them in place between the hangers, as shown in plan, and secure with nuts on the screwed ends. Here again, the hangers should still be free to move, when the nuts are tight. The nuts on the hanger pins may then be finally tightened up, and the blocks should bed home nicely against the wheels, when the beams are moved by hand.

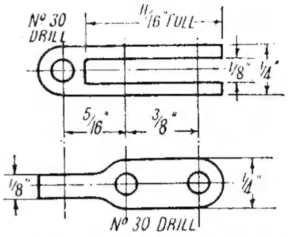
Pull-rods and Connectors

The pull-rods are different from any that I have described before. The leading one carries an adjusting sleeve, just like big sister. To make it, chuck a piece of $\frac{5}{16}$-in. hexagon rod, brass or steel, in the three-jaw, face the end, and turn 7/32 in. length to $\frac{1}{4}$ in. diameter; chamfer the corners of the hexagon. Part off at $\frac{5}{8}$ in. from the end, reverse in chuck, and repeat operation. Centre, drill right through with No. 40 drill, and tap halfway through with an ordinary $\frac{1}{8}$-in. or 5-B.A. tap. Reverse in chuck again, and tap the other half with a similar-sized left-handed tap. Make right and left-handed locknuts to suit, from $\frac{1}{8}$-in. slices of the $\frac{5}{16}$-in. hexagon rod.



Adjustable pull-rod

The forks can be either of the usual pattern, as shown at the left-hand



Pull-rod and beam connector

end of the rod in the drawing, or similar to those used on the big engines, which are forged solid with the pull-rods. Separate forks of similar shape can be easily filed up, the bosses being drilled as shown, and a pip turned on the end of the pull-rod to fit. The joint can then be brazed, and the whole lot trimmed up with a file, to look like the one-piece job; but as the pull-rods are out of sight under the tender, it is hardly worth while doing a lot of titivation which has no effect on the efficiency of the brakes—my idea, anyway, though probably not that of an exhibition or competition judge! Anyway, please yourselves, but make each fork and pull-rod to the dimensions shown, approximately $1\frac{5}{16}$ in. from centre of eye, to end of rod. One piece of rod is screwed right-hand, and the other left-hand, the locknuts being put on the respective ends before screwing the rods into the tapped sleeve. The approximate length of the completed rod, when assembled, should be $2\frac{3}{4}$ in. between centres of pinholes.

Before the exact lengths of the other pull-rods can be ascertained, the connecting pieces must be made and fitted; they are made from $\frac{1}{4}$-in. square rod. Only two are required, as the third beam is connected direct to the pull-rod fork. They are made in much the same way as the top of the combination levers in the valve-gear. Take a piece of rod about $2\frac{1}{2}$ in. or 3 in. long, clamp it under the slide-rest tool-holder, and slot it to $\frac{11}{16}$ in. full depth by feeding it up to

a $\frac{1}{8}$-in. saw-type milling-cutter on a stub mandrel held in the three-jaw. Turn the piece end-for-end, and repeat operation; then cut off both ends at about 9/32 in. from the end of the slot. The blank ends are reduced in thickness to $\frac{1}{8}$ in. as shown in the plan view, either by milling off $\frac{1}{16}$ in. from each side and finishing to shape with a file, or by filing the lot. Drill the pinholes, and round off the ends, same as for valve-gear parts. Tip : when making forks, I usually drill the holes before slotting, as it ensures their being dead in line afterwards; but if you drill them after slotting, put a scrap of $\frac{1}{8}$-in. steel between the jaws, and drill through the lot. This will prevent the drill diverging from the straight and narrow path.

How to Erect the Brake Gear

Put one of the connecting pieces on the leading brake-beam, and pin it through the hole in the middle. I've shown the regular type of pin, just to please our old nighthorse Inspector Meticulous; and if used, can be turned from $\frac{5}{16}$-in. round mild-steel. Drill the hole for the split-pin No. 55, and make the pins from thin iron wire filed flat and bent with a pair of watchmakers' pliers. However, I shan't be bothering with refinements like that, but shall use little bolts made from $\frac{1}{8}$-in. silver-steel, reduced to 3/32 in. at the ends, and screwed 3/32 in. or 7 B.A. and nutted; and I recommend all builders to follow suit. Such a bolt is shown in the end-view illustration, at the bottom of the droparm. The second connecting-piece is pinned to the middle beam in similar fashion.

Turn the brake handle backwards, until the nut is near the bottom, as shown in the elevation, then fit the front pull-rod, putting the front fork over the droparm, and the back one over the tongue of the connecting piece. Pin both forks, using either I.M. pins or Curly bolts, as preferred. Slack the locknuts and adjust the sleeve, until the blocks are about $\frac{1}{16}$ in. off the wheel treads; then tighten locknuts. Turn the brake handle until the blocks just touch the wheels. Next, with the tender upside down on the bench, press the other blocks against the wheel treads Measure from the hole in the first connector fork, to the hole in the tongue of the second connector, which will give the exact length between centres of pinholes, of the intermediate pull-rod. Then take the distance from the pinholes in the second connector fork, to the hole in the trailing beam; that does the needful regarding length of trailing pull-rod. These two rods can be made in a manner similar to the valve-gear rods, either machining them from solid rod $\frac{1}{4}$ in. square, or using $\frac{1}{8}$-in. × $\frac{1}{4}$-in. flat steel for the main part of the rod, and brazing on a little block of $\frac{1}{4}$-in. square steel, from which to machine the forked end. The illustrations give the sizes; and as I've described the process goodness-knows-how-many times, when describing previous engines in these notes, repetition should be needless. Couple up as shown, using either turned pins or bolts, and Bob's your uncle as far as the tender brakes are concerned. The blocks should all contact or leave the wheel treads together, according to which way the handle is turned; don't forget to put a spot of oil on every moving joint. The best lubrication for the bevel gears, would be a taste of ball-bearing grease, which can be applied before the assembly is screwed to the front plate of the tender.

Several builders have been worrying me about the final oddments needed for the engine part. Don't fret, I haven't forgotten them; as a matter of fact I've been doing a bit of experimenting to get a three-note chime whistle which sounds like the real goods. It's been a bit of a wangle to find a suitable place for it, but the problem is solved, as you'll see in the very near future, all being well.

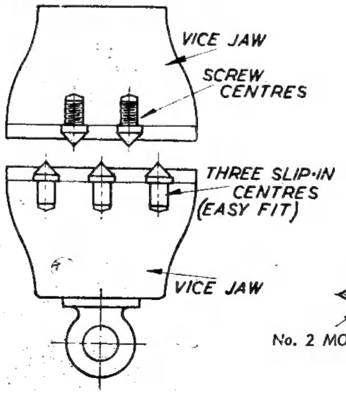
UNUSUAL USES FOR CENTRES

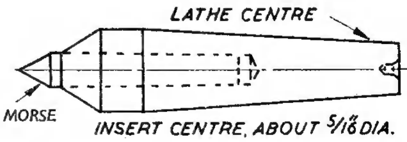
By James W. Tracy

NOT long ago I had a job of turning the commutator of an armature weighing about 1 cwt. on a $6\frac{1}{2}$-in. lathe with an extra long bed. At the time I could not help thinking what a wonderful thing a lathe centre was, the weight supported, plus cut, and if well oiled it did the job. My thoughts were then brought back to some unusual jobs centres can be used for, with great advantage. If you remove the jaws from your vice and fit it up with some holes to take centres, you can hold all sorts of awkward-shaped jobs in a very firm manner. The sketch will, I hope, show what I mean.

At the handle end of the vice, drill three holes to take, say, $\frac{5}{16}$-in. silver-steel centres—if hardened and tempered so much the better. On the *fixed* jaw drill and tap for two screwed centres, a nice easy fit. With a combination of about three centres spaced to suit the work, you can hold all sorts of odd shapes. Of course, the work needs a few centre-pops to get a grip of things, but in many cases these can be erased later. I have seen a machine vice on a planing machine standing up well to some really good cuts with only three centres in use. With some of the awkward-shaped parts that model engineers have to deal with I have no doubt that some of them may find this vice conversion useful—and it does not ruin the vice.

Here is a tip that has saved me *endless profanity*. All turners know how exasperating it is when nearly finishing a job for the tailstock centre to need replacing, and there is no spare. Take an old spare, soften and drill to some standard size, mine is $\frac{5}{16}$ in. for a $6\frac{1}{2}$ in. lathe. Then turn up three or four spares in silver-steel, harden and temper. When a replacement is wanted, warm up and tin, and sweat the new centre in position. If carefully done, the temper will not be altered. The whole job of taking out and sweating in a new centre can be done in a few minutes. To be up-to-date, however, you should have a running centre.





IN THE WORKSHOP

BY DUPLEX

A JIG-SAW MACHINE

THE saw-guide illustrated in Fig. 39 serves all three purposes essential for accurate sawing, namely: the thrust is taken by a hardened roller, adjustable for different blade widths; the saw is guided by a pair of hardened rollers, adjustable to conform to the thickness of the blade; as in the ordinary sewing machine, a pressure foot, adjustable for height, makes contact with the work and keeps it from being lifted on the return stroke of the blade.

Those who prefer a less elaborate fitting will, possibly, be content with a simple thrust roller mounted in a fork; but, when sawing curved work, it seems essential to provide laterial guidance for the saw blade in order to maintain alignment. It is also tiresome to try to work without a pressure foot, as the alternative is then to hold the work down with one hand while guiding the material with the other.

There is, however, no real difficulty in making the guide-head described, and it will provide, on a small scale, some interesting machining and hand-fitting of the various parts.

Continued from page 469 *October* 15, 1953.

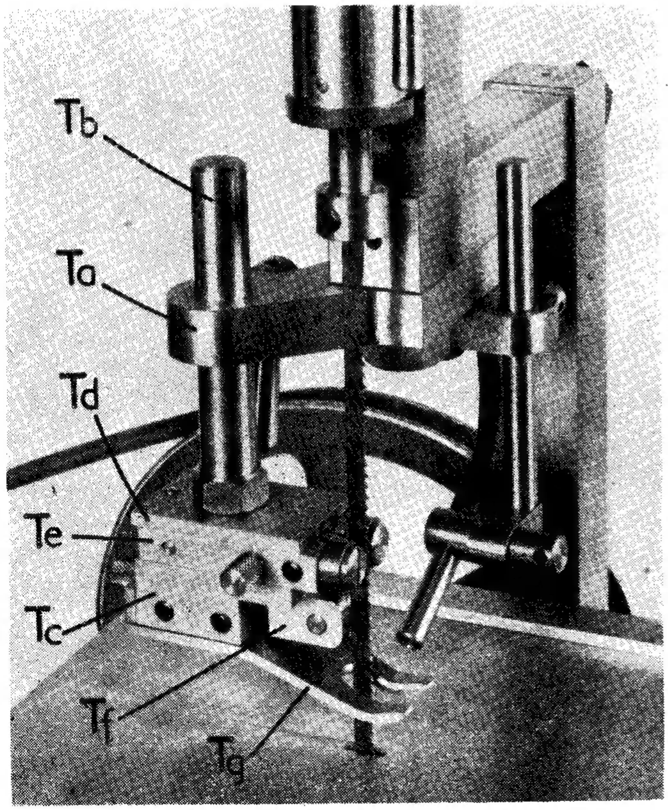
The Saw-Guide Bracket—Ta

This is bolted to the underside of the frame arm, and its purpose is to carry the spindle to which the saw-guide itself is attached. The hole for the $\frac{1}{4}$ in. diameter bolt should be drilled from the frame-arm, after the fitting has been aligned and secured in place. As the height of the pressure foot, attached to the under surface of the guide, has constantly to be reset, this operation is facilitated by fitting a convenient form of handled clamping-screw.

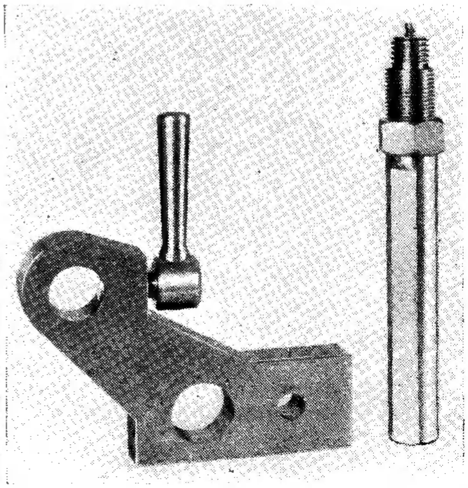
As shown in the drawing, this screw is furnished with a brass or duralumin pad-piece in order to avoid damaging the clamping surface and, in addition, the clamp handle is made detachable so that the screw can be inserted in place.

The Saw-Guide Spindle—Tb

This part is threaded at its lower end to screw into the body of the guide, and the upper threaded portion carries a recessed nut for clamping the two guide rollers by means of the pressure plate *Td.*



Left: *Fig.* 39. *The saw-guide parts. Ta—the saw-guide bracket; Tb—the saw-guide spindle; Tc—the body; Td—the cover plate; Te—the guide-roller assembly; Tf—the thrust roller assembly; Tg—the pressure foot.*



Below: *Fig.* 40. *The saw-guide bracket and spindle*

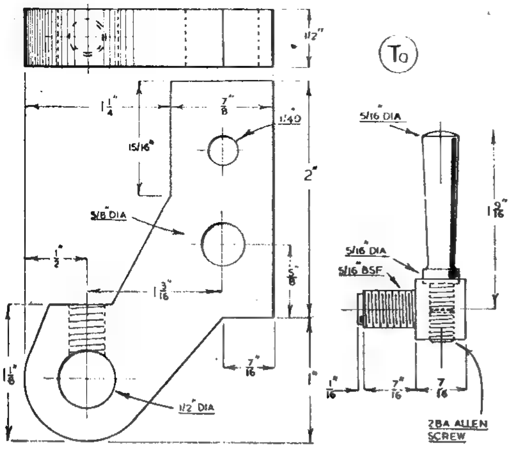


Fig. 41. The saw-guide bracket and clamp-screw

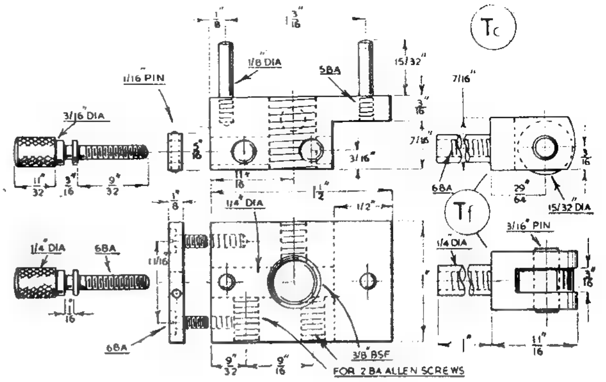


Fig. 43. The saw-guide body and thrust-roller assembly

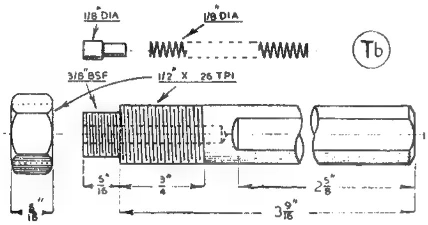


Fig. 42. The saw-guide spindle and pressure-pad

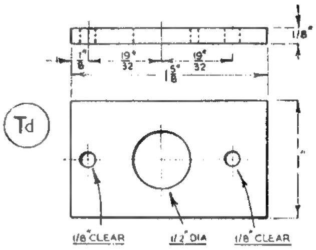


Fig. 44. The cover-plate

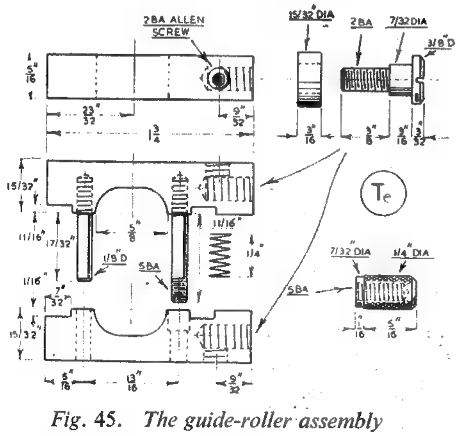


Fig. 45. The guide-roller assembly

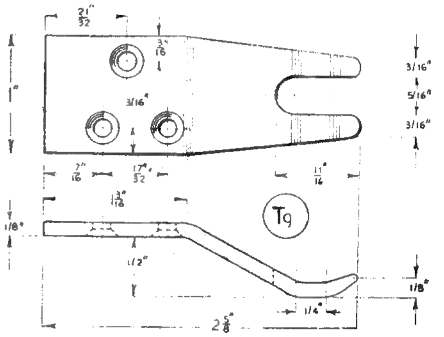


Fig. 46. The pressure foot

The flat should not be filed or machined on the spindle at this stage, but is left until the saw-guide has been mounted in its working position. The spindle can be fitted with a small, spring-loaded pressure pad at its lower end for controlling the movement of the thrust-roller spindle.

The Saw-guide Body—Tc

The body is made from a piece of 1-in. × $\frac{5}{8}$-in. mild-steel, which is first drilled and tapped to receive the end of the spindle *Tb*. The part is next drilled and reamed lengthways for the spindle of the thrust-roller fork, and the body is cut away to accommodate the latter fitting.

Three 2-B.A. Allen grub-screws are fitted to the body; the two in front are furnished with pad-pieces and serve to lock the spindle of the thrust-roller after adjustment; the third screw, at the back, secures the spindle *Tb* after it has been screwed firmly against its shoulder.

The Cover Plate—Td

The guide roller assembly is locked after adjustment, when this pressure plate is secured by tightening the nut on the spindle *Tb*. The plate is guided by means of the two

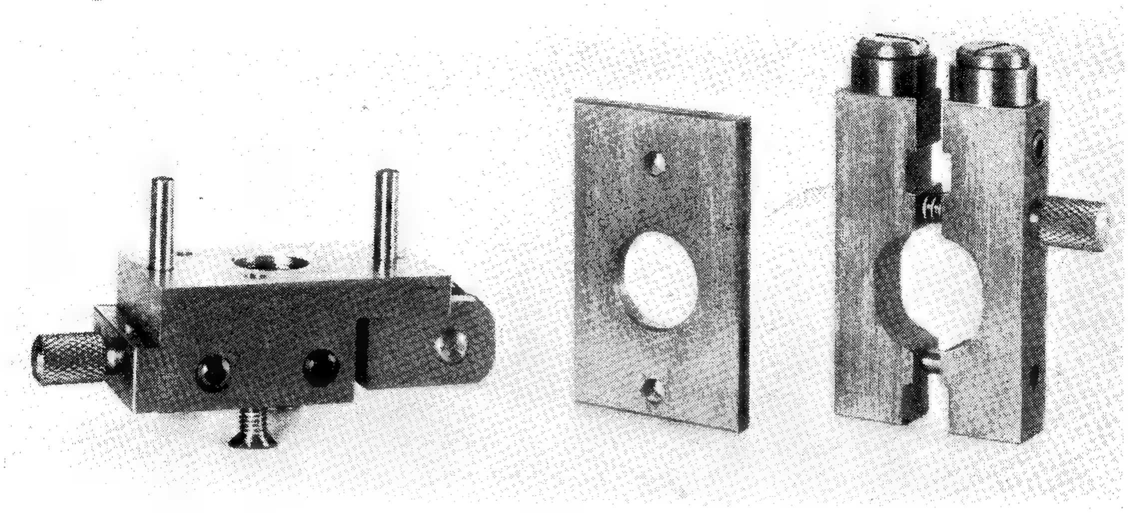


Fig. 47. The parts comprising the head of the saw-guide

⅛ in. diameter pegs screwed into the upper surface of the body.

The Guide-Roller Assembly—Te

The two bars carrying the guide-rollers are filed to shape to afford a passage for both the spindle *Tb* and the two cover plate guide-pegs; in addition, these slots allow the assembly to move endways, in order to accommodate saw blades of various widths. The rollers themselves are turned from silver-steel and are finally hardened.

The two pivot-screws for the rollers are also hardened, and each is secured, after adjustment, with a 2-B.A. Allen grub-screw.

As will be seen, the gap between the rollers is adjusted by means of a knurled finger-screw, and a spring is also fitted to move the rollers apart. At the other end, a guide-pin is fitted between the two bars to ensure smooth working. With this construction, the rollers are adjusted by first slackening the spindle nut, and then turning the knurled screw until the rollers are brought into contact with the saw blade; the assembly is finally secured in place by again tightening the spindle nut.

The Thrust-Roller Assembly—Tf

The hardened steel roller is carried in a fork, screwed on to the end of the ¼ in. diameter silver-steel spindle; for this purpose, the spindle is shouldered down and threaded 2 B.A. The upper surface of the

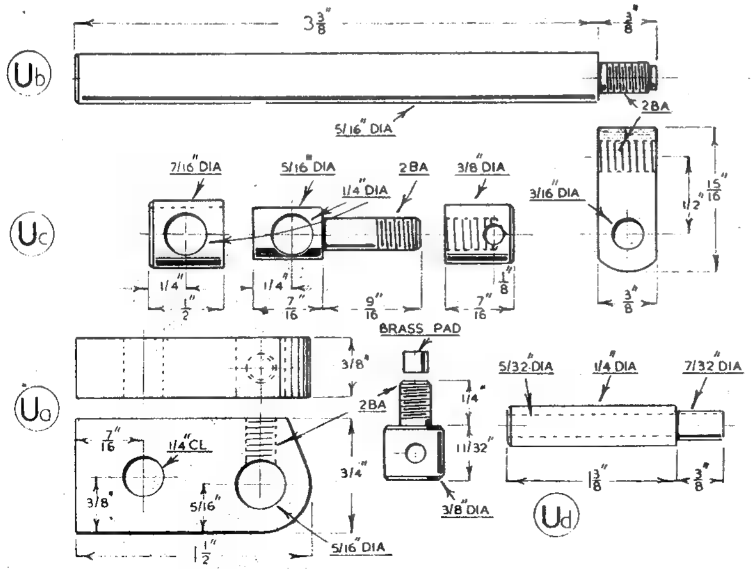


Fig. 49. The components of the air nozzle assembly

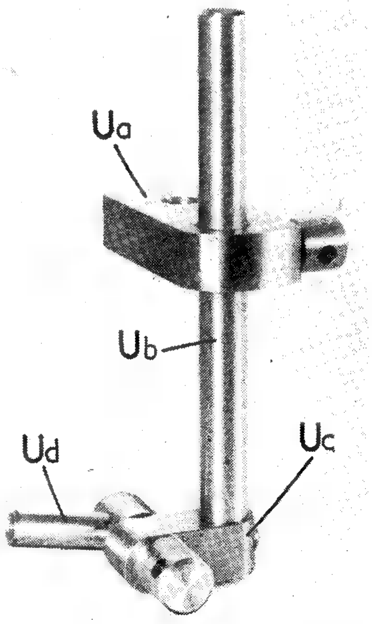


Fig. 48. The air nozzle assembly. Ua—the bracket; Ub—the spindle; Uc—the nozzle holder; Ud—the nozzle

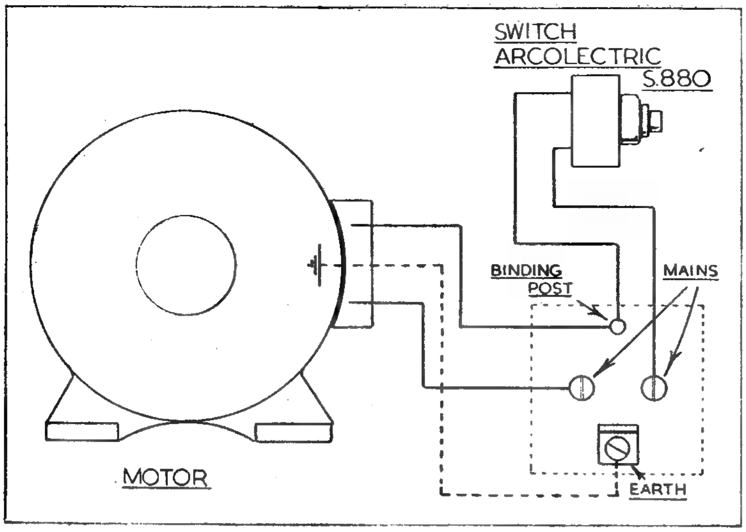


Fig. 50. The wiring diagram for connecting the motor and switch

fork is carefully filed to an accurate sliding-fit in the cut-away portion of the body; in this way, the fork is guided so [redacted] to keep the roller vertical. After the roller has been set into contact with the back of the saw blade, the roller-spindle is locked by means of the two Allen grub-screws shown in the drawing; these screws should be furnished with soft pressure-pads to avoid damaging the spindle.

In keeping with the mode of setting the guide rollers, the thrust roller has been fitted with [redacted] knurled finger-screw for making adjustments, but this mechanism can be dispensed with if not considered worth while. The finger-screw is located in a small keep-plate by means of a cross-pin, engaging in [redacted] groove turned under the head of the screw, and the threaded end of the screw enters the threaded bore formed in the spindle.

The Pressure Foot—Tg

Mild-steel strip, 3/32 in. in thickness, will serve for making this fitting. After the material has been cut to shape, it is bent to the form shown in the drawing, and then secured to the underside of the body with three 5 B.A. countersunk screws. To keep the work from lifting after it has been sawn through, the flat, contact portion of the foot should extend well behind the line of the saw teeth.

When finished, the saw guide is mounted in its bracket and the second, $\frac{1}{4}$ in. diameter, attachment bolt is fitted. After the saw-guide has been aligned to lie parallel with the edge of the saw-table, the position of the flat on the saw-guide spindle can be marked-out, and the flat is then formed either by filing or machining.

The Air Nozzle Bracket—Ua

This fitting is held in place by the $\frac{1}{4}$ in. diameter bolt used to secure the saw-guide bracket, and [redacted] clamp-screw, furnished with [redacted] brass pad-piece, serves to hold the spindle *Ub*. The lower end of this spindle is shouldered down and threaded 2 B.A. for attaching the nozzle holder *Uc*. This holder consists of a cross-drilled spindle and thimble, pulled down on the nozzle by means of a cap-nut.

The nozzle itself (*Ud*) is made by drilling axially [redacted] short length of $\frac{1}{4}$ in. diameter rod. In this way, the nozzle is provided with [redacted] universal mounting which allows the air jet to be directed to the best advantage.

The Wiring—Fig. [redacted]

For connecting the $\frac{1}{4}$-h.p. motor to the electricity supply, the leads can be fitted with [redacted] socket of the kind usually supplied with electric irons, but the 3-pin plug, attached to the baseboard, will probably have to be specially made, as no commercial fitting of this type appears to be available. As shown in Fig. 51, the two pins of the plug [redacted] mounted in an insulating block, which is secured to the baseboard, and the wiring is held with binding screws to the lower ends of the pins. For additional safety, [redacted] strip of insulating material is attached to the under side of the baseboard to cover the live connections and an

(*Continued on page* 523)

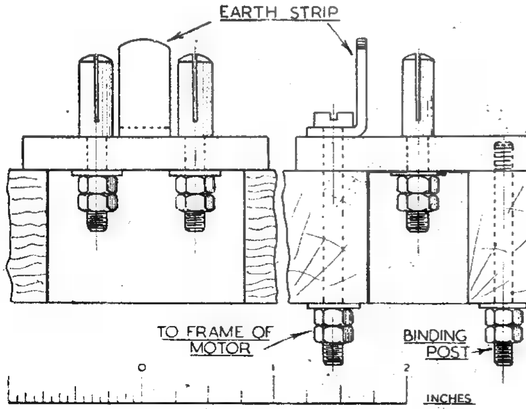


Fig. 51. Details of the plug connector attached to the baseboard

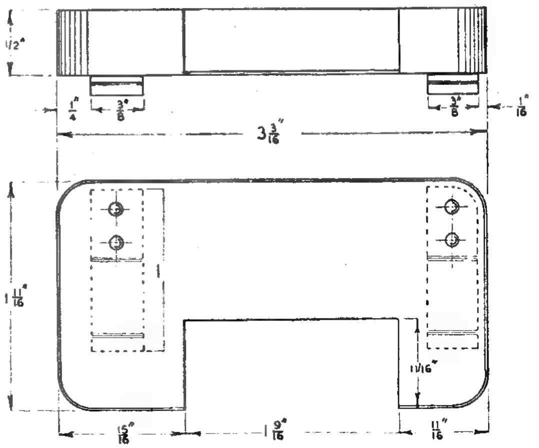


Fig. 52. The removable swarf tray

A Research MICROSCOPE

by Lawrence H. Sparey

WE are now approaching the final stages in the manufacture of this instrument, and with the completion of the substage described in this article, the actual stand of the microscope will be finished. This means that with the addition of the lenses, and other parts which must be purchased, the instrument is ready for use, and we may reap the reward of our labour.

In view of the work which has gone before, there is nothing in the substage which will give the constructor any qualms, as we have merely a repetition of the various processes of milling and turning with which we should now be familiar. The substage is, essentially, only a slide, carrying a bracket in which the optical component is fitted. This bracket is not, however, fixed rigidly to the slide, but is carried upon a hinge which enables the condenser to be swung out of the optical axis of the instrument.

The condenser itself is carried in a housing, which is free to move within the bracket; in this way, the condenser may be brought central with the optical axis of the instrument. For this purpose the housing may be adjusted by three knurled screws against a spring loading. These various movements rather tend to add to the difficulty of keeping the substage in correct alignment. It is highly important that it be substantially and accurately made, as it is ■ most important fitting. In particular, it is necessary that the bracket be fitted at a true right-angle to the slides, and that the bearing surfaces of the bracket and housing are truly flat. In addition, the hinge-pin must be a really good fit in the reamed hole in the bracket.

The Slides (A) and (C)

The essential here is that the slot which locates the hinge bracket *E* should be truly at a right-angle to the rear face of the assembled slide, and also at ■ true right-angle to the longitudinal faces of the vees. My own method of working was completely to machine and finish the slides, and to rough out the milled slot for the hinge bracket. The components were then assembled, complete with gib strip, with the gib adjusting-screws tightened down as hard as possible. The assembly was then mounted in the milling jig (shown in Fig. 6, page 34, THE MODEL ENGINEER issue July 9th, 1953) and the locating slot finish-milled to size.

Hinge Bracket (E)

As will be seen, this is ■ very substantial fitting, as it carries the whole of the substage assembly. The back face must be at ■ true right-angle to the top face, and the 2-B.A. tapped hole must be true with both.

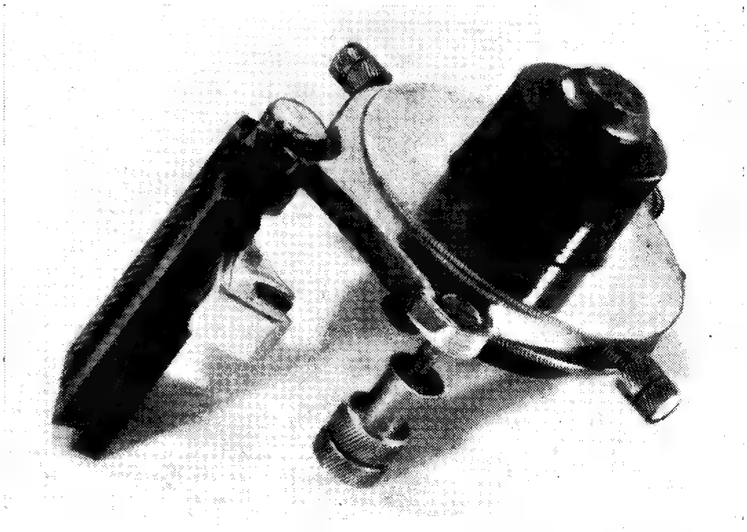
Bracket (D)

It is important, here, that the component be truly flat and of equal thickness ($\frac{1}{4}$ in.), and that the reamed hole be at ■ right-angle to the bottom face, and square with it in all directions. It is, in fact, advisable to drill, ream and counterbore with the component mounted on the lathe faceplate, rather than to rely upon the drilling-machine. This advice also applies to the tapped hole in detail *E*.

Condenser Housing (F)

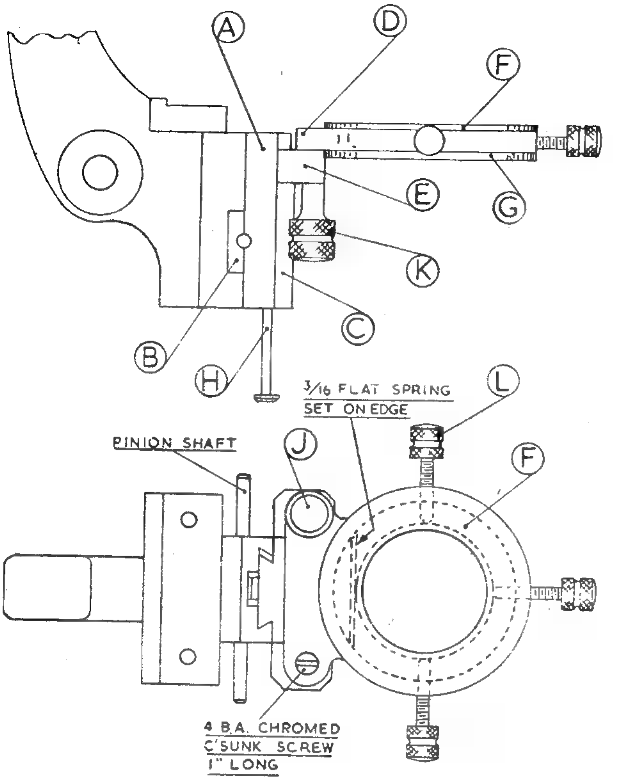
In ■ future article I hope to deal with the choice of optical equipment for our microscope, when some of the available types of illuminating apparatus will be discussed. At the moment, we are concerned only with the housing. Fortunately, the Royal Microscopical Society, many years ago, set a standard size for condenser housings, and this standard is adhered to almost universally. For some reason, which I have never discovered, the very curious size of 38.786 millimetres, or 1.527 in., was settled upon. At the same time, I have occasionally seen condensers, especially those of German manufacture, which do not conform to this standard.

In view of this, it may be advisable first to purchase your condenser, either new or second-hand, from one of the well-known optical firms. Messrs. Broadhurst Clarkson and

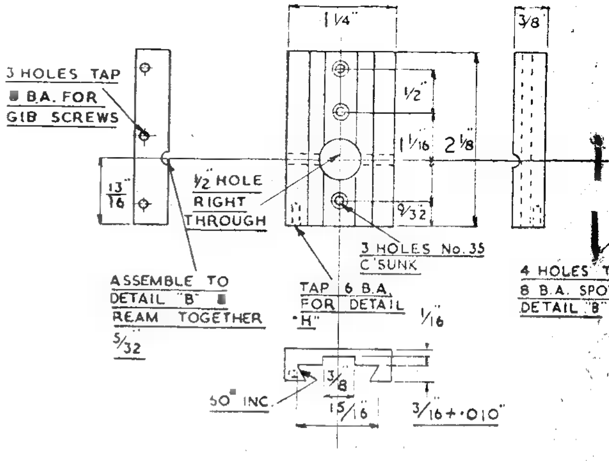


The condenser mounted in the substage bracket, with the hinge fitting swung open. The locking-screw and the three centring screws are well shown

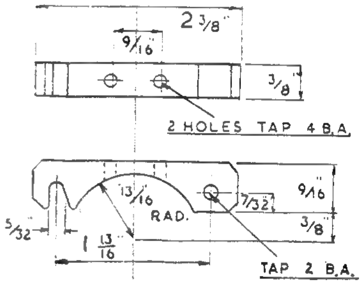
Continued from page 352, September, 17, 1953.



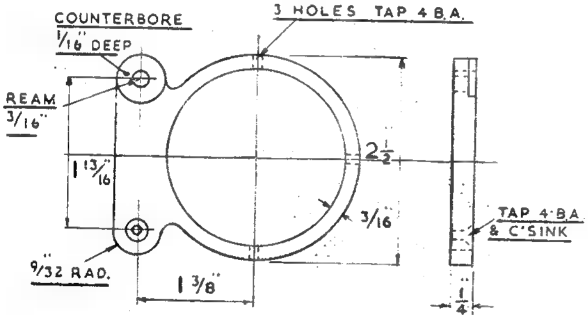
SUBSTAGE ASSEMBLY



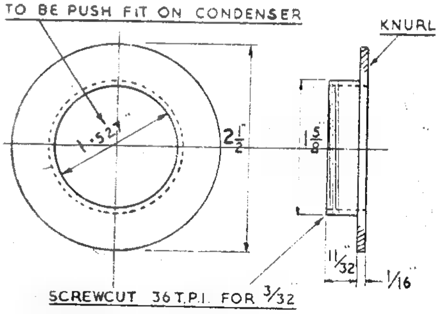
(A) REAR SLIDE (BRASS)



(E) HINGE BRACKET (DURAL)

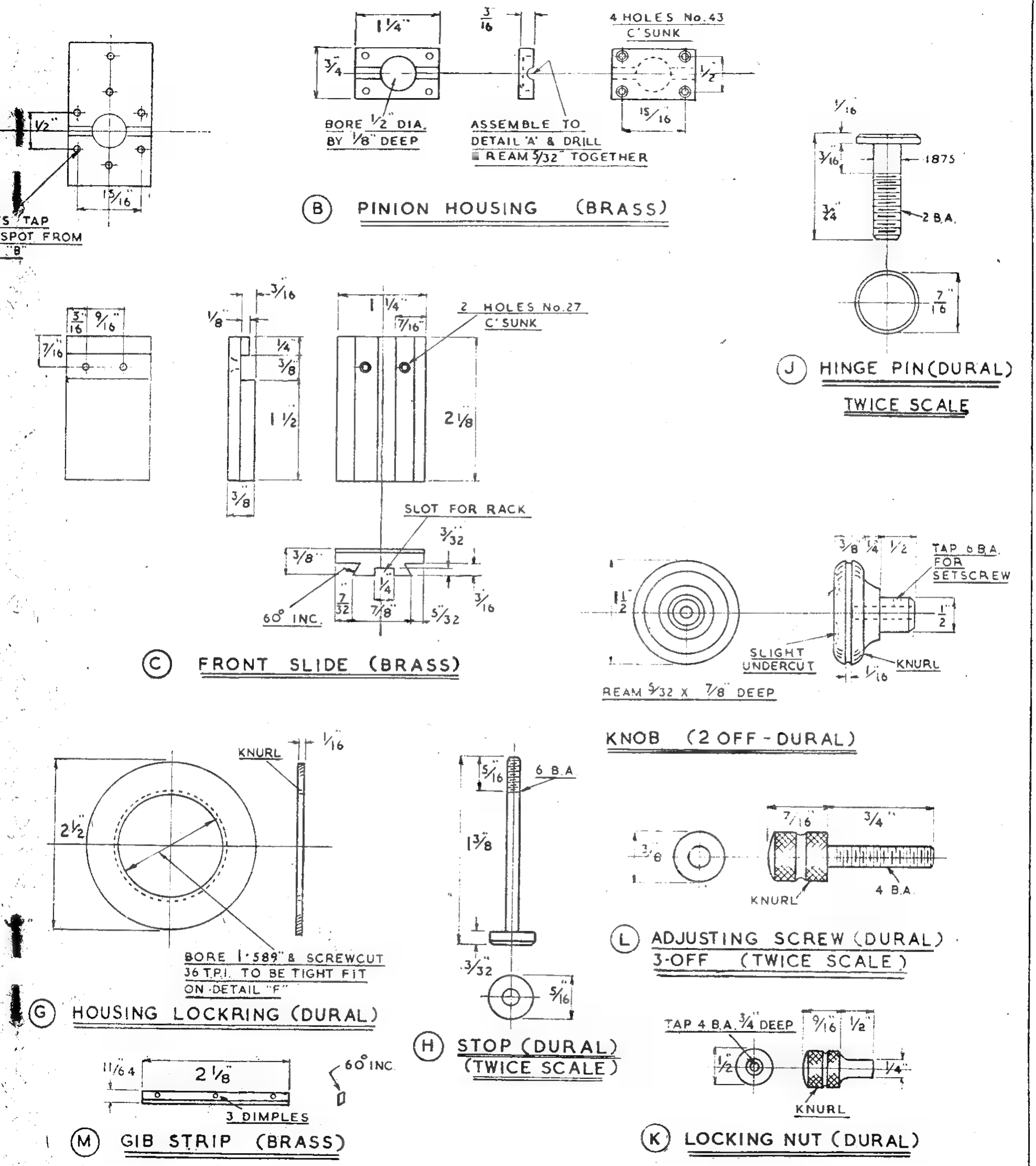


(D) BRACKET (DURAL)



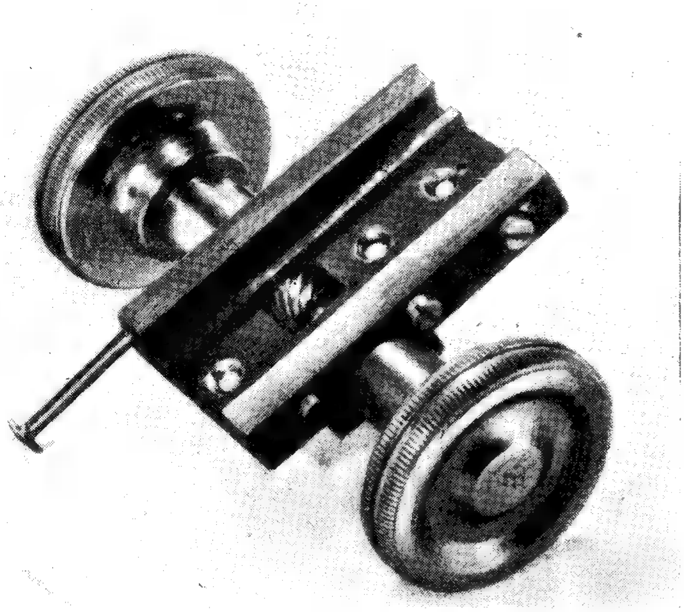
(F) CONDENSER HOUSING (DURAL)

FIG.



B PINION HOUSING (BRASS)
BORE ½" DIA. BY ⅛" DEEP
ASSEMBLE TO DETAIL 'A' & DRILL & REAM 5/32" TOGETHER
4 HOLES No. 43 C'SUNK
C FRONT SLIDE (BRASS)
2 HOLES No. 27 C'SUNK
SLOT FOR RACK
60° INC.
J HINGE PIN (DURAL)
TWICE SCALE
2 B.A.
.1875"
KNOB (2 OFF - DURAL)
TAP 6 B.A. FOR SETSCREW
SLIGHT UNDERCUT
KNURL
REAM 5/32 x ⅞" DEEP
G HOUSING LOCKRING (DURAL)
BORE 1·589" & SCREWCUT 36 T.P.I. TO BE TIGHT FIT ON DETAIL "F"
KNURL
H STOP (DURAL) (TWICE SCALE)
6 B.A.
L ADJUSTING SCREW (DURAL) 3-OFF (TWICE SCALE)
4 B.A.
KNURL
M GIB STRIP (BRASS)
3 DIMPLES
60° INC.
K LOCKING NUT (DURAL)
TAP 4 B.A. ¾" DEEP
KNURL

G. 18



Rear slide of substage, showing stop pin, and the pinion assembly

Co., of 63, Farringdon Road, London, E.C.1, should be able to help. It is, in fact, a great advantage to have the condenser at hand when boring the housing, as it is secured in place only by a push-fit, and it is most convenient to be able to test the fit while the component is still in the lathe. In this way, the final "sniff" may be removed with fine emery-cloth as the job revolves.

The points to watch when machining the housing, apart from the fit of the condenser, are that the inner face of the flange be truly square with the bore, and that the lock-ring thread be a fairly tight fit.

In the assembly drawing in Fig. 18, it will be seen that a flat spring, set on edge, has been indicated, and it will be understood that this spring is fitted within the bracket in such a manner as to exert pressure upon the housing in opposition to the adjusting-screws. The spring is necessary in order to give a forward movement to the housing, as it is not possible to place a fourth screw for this purpose.

The housing lock-ring *G*, should be screwed up until the housing is a nice, slide fit on the bracket, without any rock. If the threads have been made a fairly tight fit, as advised, there will be no tendency for this adjustment to slacken.

In the original instrument the finish was in black enamel and chrome plate, and in order to save a certain amount of cleaning-up, filling, and stopping, the limb and foot were finished in crackle enamel. This was a mistake, as, apart from being out of keeping with the instrument as a whole, it was found that the crackle finish collected the dust and dirt, and quickly became shabby. When the instrument was rebuilt to conform with these articles, the new limb and foot were finished in black, glossy cellulose, with an improvement in appearance beyond all expectations.

As I could hardly know less about spray painting, my methods are, doubtless, not those of the professional; yet you can have them for what they are worth. The chief difficulty is in preparing the surface for the final coats, as the castings are, of course, pitted and uneven. The first step was to file the castings up as smoothly as was possible. They were then washed in cellulose thinners, and given a coat of *cellulose undercoating*, which is red in colour.

All visible pits, holes and roughnesses were then filled with *cellulose filler*, which is a grey substance resembling putty. Allowing this to harden thoroughly, the whole casting was then rubbed down with a special abrasive paper, known as "Wet or Dry," used wetted with plenty of water. After washing, another coat of undercoating was sprayed on, and this also was duly rubbed down with fine-grade "Wet or Dry," and washed in a bucket of clean water.

At this stage a great number of imperfections which had been missed, became evident, and these were stopped with the filler, rubbed down, and washed off. It now became obvious that the higher the finish became the more visible were the imperfections, so, in order to expose them thoroughly, a coat of black, finishing cellulose was applied. This proved a wise move, as a considerable number of bad places were revealed, which were duly stopped and rubbed down.

From here, the processes were repeated, finishing with three coats of finishing enamel, only the *last* of which was *not* rubbed down. Finally, a thorough polishing with "Brasso" metal polish gave a brilliant, deep finish.

Machined surfaces, such as those of the slides, are not, of course, enamelled, and to prevent the spray covering these parts they must be masked. For this purpose I used ordinary, gummed paper tape, such as is used for securing paper parcels.

Should you intend to spray your own instrument, I would strongly emphasise that you obtain all your materials from the same source. Cellulose enamel will not mix with the synthetic enamels now used by most professionals, nor is synthetic undercoating and filler suitable for cellulose. If pure cellulose enamel is sprayed upon these synthetic substances they will wrinkle and lift, and there is no cure except to clean the whole job off. Similarly, should you have your instrument professionally finished, be sure that you obtain a small quantity of the finishing enamel for touching-up purposes.

In the drawings which have accompanied these articles, many of the components have been indicated as being made of dural. In every instance it may be taken that these parts may be of dural, chromed brass, or stainless-steel. Dural would, of course, be ideal were it not for its light weight. A good microscope should be quite a heavy instrument, as this gives steadiness, and a comfortable feeling of solidity in the handling.

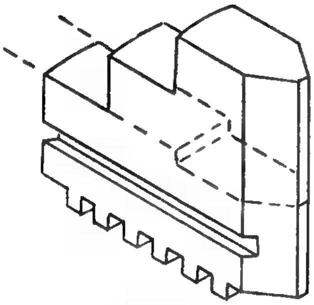
In order to protect polished surfaces upon which the microscope may be placed, and to give a grip to the feet of the instrument, rubber pads should be fitted to the three bosses on the underpart of the foot. A satisfactory solution, in my own case, was provided by three rubber tap washers, which were secured to the feet by countersunk screws, tightened so that they embedded themselves into the rubber, and thus lay below the general surface level.

(*To be continued*)

Life in the Old Chuck yet! —— By A.E.U.

HOW TO FIT AND USE SOFT JAWS ON LATHE CHUCKS

ONE of the most difficult operations encountered by the amateur engineer in his home workshop, is that of rechucking washers truly, especially thin washers., The rechucking of turned parts also is sometimes difficult without mark-



Chuck-jaw, showing line of cut dotted

ing the parts in relation to the chuck jaws.

The device to be described is a very old inhabitant of the engineering world, the soft-jaw chuck (a normal self-centring chuck fitted with soft jaws). If you have a fairly new chuck you can usually obtain soft jaws from the makers. Most of us, however, possess an old chuck that is in the words of a well-known comedian: "Past it, poor soul!"—with the jaws badly worn and bell-mouthed. The purpose of this article is to give the old-timer a new lease of useful life, as a soft-jaw chuck.

Basically, the idea is to cut back the original jaws, and fit them with replaceable soft extensions that can be machined to suit any particular job.

Hot and Cold

The original jaws should he put in the fire until red-hot, and then laid in the ash and dust underneath to cool slowly. The jaws can now be cut back, as shown in the sketch, replaced in the chuck and faced off to a common height; the step can be squared off with a file.

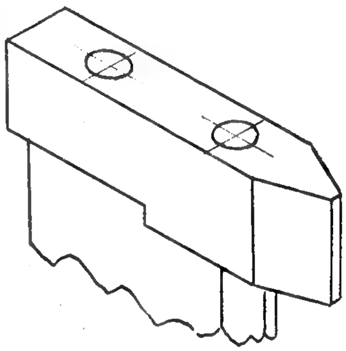
The soft jaws can be made from bright mild-steel. At least two sets of jaws should be made, also a drill jig. The jaws should be jig-drilled, and the holes transferred into the original jaws. Any convenient thread can be used for securing the jaws, but I would advise the use of B.S.F. instead of Whit., and the use of socket-head screws. After fitting the jaws, the original jaws can be rehardened (by making them red-hot in the fire and quenching in cold water).

To use the chuck the jaws should be screwed on finger-tight, closed tightly on a bar and the screws then locked as tightly as is possible without stripping.

The chuck jaws must have a recess turned in the front so that a washer can be held whilst the rest of the jaw is turned true. The washer, should be held at approximately the same pressure as it is intended to hold the workpiece, so that the distortion of the chuck jaws will be the same in both cases.

The uses of a soft-jaw chuck are innumerable, and once used it is difficult to do without them.

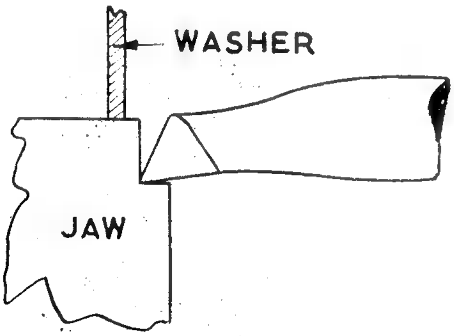
NOTE.—It is important to bore the soft jaws to the size of the



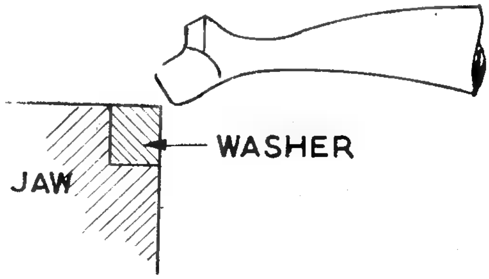
Soft-jaw in position, jaw nose 60 deg. inc.

job to be held or slightly larger. Also, the jaws are given a greater included angle at the point than normal, so that they will continue to hold small diameters after many rebores.

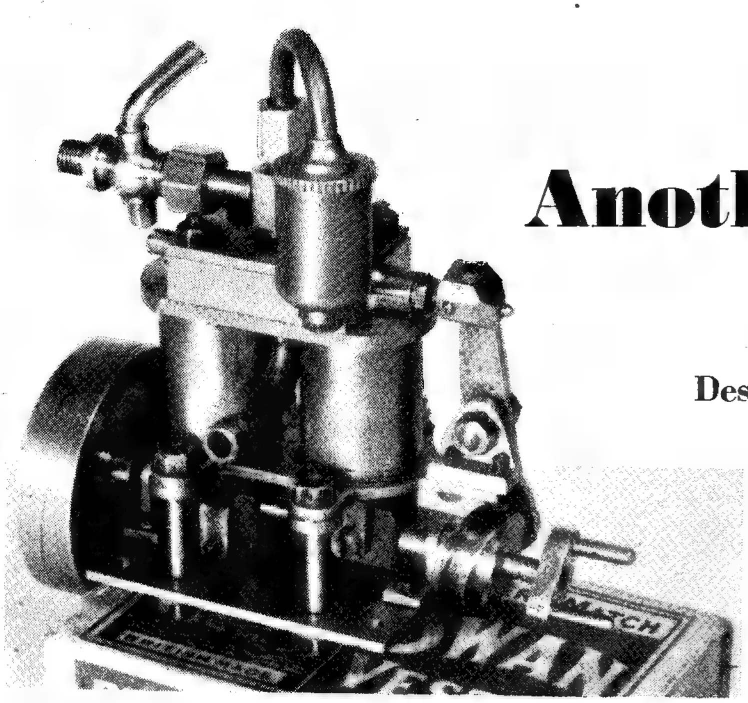
One final point, the soft-jaw chuck is not a *substitute* for the conventional chuck with hardened jaws. It is a useful ally.



Set-up for recess boring



Set-up for boring jaw



Another First Attempt

Described by C. H. Clarke

View of Master Corti's marine engine from port side, showing valve-cam groove, also exhaust-pipe between cylinders. Actual size

IN an editorial in the issue for July 2nd this year, it was mentioned that a straightforward steam engine serves best as an introduction to model engineering. Here is an example of it. The model shown in the accompanying photographs was made almost unaided by a lad of 16, who had never seen any model engineering before, and had handled no more than a few carpenters' tools. It is hoped that it will be an example and encouragement to other beginners.

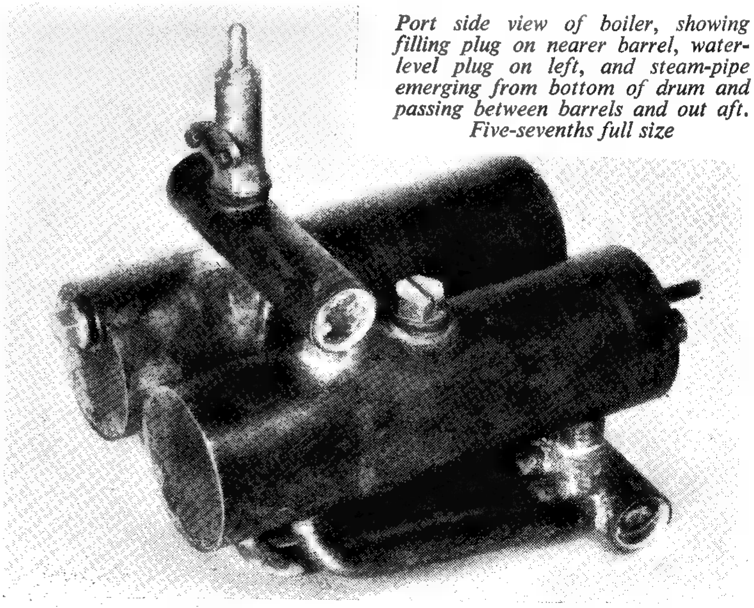
The boy, Charles Corti of Sedan (the point where the German Army broke through in 1940), is a French citizen of Italian parents, speaks four languages, and came to this country for a holiday and to improve his use of the language. He reports that there is practically no model engineering practised in France other than model aircraft, an occupation for which he has no use. One of the accidents of life caused arrangements for his stay to be made with the present writer. He had little idea of what he was coming to.

Soon after his arrival, he was fired with enthusiasm by what he saw in the workshops and their output. He must make a model steamboat. By watching the writer at work, following his explanations, and working to the drawings provided, he executed the work illustrated at the first attempt; that is, no scrap of any sort was produced by way of practice. The eock is, of course, a purchased article, and a few other items like union nuts, etc., were made by the writer merely because of convenience and time-saving when other parts of the same kind were being made. All cutting, filing, turning, fitting, and soldering are the lad's own work, including all parts of the lubricator and safety-valve.

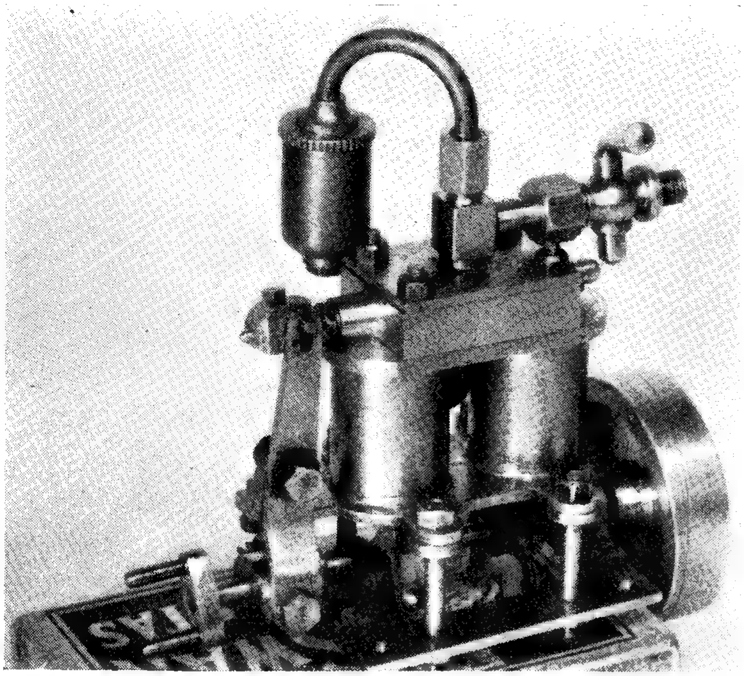
The slide-valve is operated through a lever of the first order, a pin on the lower end of the latter working in a wavy cam groove seen clearly in the port side view. This groove was turned in the lathe using a square tipped tool, like a parting tool but with much greater side clearance, while the saddle was oscillated in step with the mandrel. The gear and set-up for doing this was made almost entirely by the boy, to the writer's design.

The pistons, turned and hollowed from solid aluminium alloy rod, were measured by the writer on their completion and were found to be within 0.00025 in. of the given diameter, and round and parallel all over to within 0.0001 in. The brass tube cylinders were lapped to a fit such that, quite dry, the pistons would spring right back with suction if drawn out and let go at once. An expanding aluminium lap was used. The complete engine weighs 8½ oz. It is entirely fabricated, including the flywheel, from rod, tube and sheet.

The boiler barrels are made from brazed brass tube 1⅛ in. diameter, 24 s.w.g., the ends being plain brass discs, 22 s.w.g., recessed in tightly. The steam and water drums are



Port side view of boiler, showing filling plug on nearer barrel, water-level plug on left, and steam-pipe emerging from bottom of drum and passing between barrels and out aft. Five-sevenths full size



View showing valve lever with slot connection to valve-spindle

made in the same way. The water-tubes, of which there are four to each barrel, are of solid drawn copper, 7/32 in. diameter, 26 s.w.g. Every joint is silver-soldered, using a mouth blowpipe, with a bunsen flame to assist in maintaining the heat when working on the larger assemblies. The joints are so close that only two grammes of solder were used for the whole boiler. It is practically indestructible, being in effect one piece of metal. Few realise the strength of these small boilers. If one takes the tensile strength of sheet brass, according to the engineering pocket-book tables, as 14 tons per sq. in., and allows the brazed joint to be only half this, the bursting pressure for the above barrel works out at 920 lb. per sq. in., and as 7 is an ample factor of safety in the case, a safe working pressure is 130 lb. per sq. in. The boiler, complete with fittings, weighs 7 oz. and holds 3 fluid oz. to top working level. It is to have a sheet aluminium case lined with 1/32 in. asbestos, and later on a hand feed-pump will be provided. The connection for the check-valve for this is seen on the extreme right of the photogrpah. This will enable longer runs to be obtained without letting down the pressure. At present the water lasts about 15 minutes with a four-wick spirit lamp. The plug seen on the left fills the place for an upper limit water-level cock. This cock and the check-valve are not yet made, and the hex. plugs were put in to enable boiler and engine to be tested. The steam pipe, $\frac{1}{8}$-in. copper, is taken from the top of the steam drum, passing in a curved sweep between the barrels, and out to the rear where it can be seen in the photograph. This gives a small degree of superheat, and considerable flexibility for settling later the relative positions of boiler and engine in the boat.

This young modeller also made tracings from the writer's drawings for all the plant and the lines of the boat, made the propeller, shaft, stern tube, and ball thrust-bearing, and has cut out and erected the framework for the hull, to be built by planking. Solid wood or layers were not real enough for him.

This work occupied all spare time in the six weeks left of his stay after the work was decided upon. All this, in its unfinished form, has now been taken back to France, with enough material for the boiler case and some details, where the type of superstructure is yet to be decided according to his fancy. He also purchased here, and took back, a considerable workshop nucleus in the form of small tools, and has determined to start at once and make his own lathe on the lines of a knock-up he saw here, made by the writer for another young pupil, consisting of a bicycle hub, two pieces of channel, and various bits of steel rod, tube, and oak supports. Who knows but what, when this fine piece of workmanship is seen by his fellow countrymen, the seeds of model engineering may be sown in a country whose youth has, hitherto, paid little attention to it ?

One of the boy's remarks here should confound the advocates of reform in our system of measurements, etc. He said that our method of dividing the unit length (inch) into halves, and halves again down to 64ths, is far simpler and much more convenient than any decimal system when once one knows how to use it. He included an English rule in the equipment he bought, and intends doing all his work to it.

A JIG-SAW MACHINE

(*Continued from page* 516)

earthing connection is provided for the motor.

The 3-core cable is fitted with a rubber or plastic grummet where it passes through the baseboard, and the run of the wiring is secured with small saddles. As the motor will have to be switched on and off fairly often during working, a push-on push-off switch is probably the most convenient type, and a 3-amp switch of this pattern has proved most satisfactory.

As can be seen in Figs. 5 and 23, (see previous issues) the switch is mounted in a metal strip attached to the webs of the two foot brackets supporting the base- plate.

The teeth of the saw blade carry the swarf downwards on the cutting stroke and, to protect the driving mechanism, the wood or metal dust can be caught in a small tray attached to the bearing bracket of the drive-rod. The swarf tray Fig. 52 is fitted with spring clips to allow of easy removal for emptying.

This completes the construction of the main machine, but its usefulness will be greatly enhanced if detachable fences are fitted to ensure accurate cutting to both length and width, as well as mitring and circular cutting. It only remains, therefore, to describe the construction and use of these fittings.

TWIN SISTERS

by J. I. AUSTEN-WALTON

I SEE that one small point still remains to be dealt with before we can say that the smokebox story is finished. Reference was made to it in the previous article, and you would be bound to come across it before very long. The back smokebox ring was suggested as a gun-metal casting, due to the need for a small silver-soldering job on it. When this ring is inserted in the barrel, it will be seen that the hole drilled for the main steam pipe, is only partly covered by the ring flange, entailing the cutting out of just about half a hole on which the locking-nut would have to rest—not very good if left like that. The solution is to silver-solder a small piece of stout brass to the edge of the flange at this point, the gauge of the extra tab being selected to match the flange thickness, whatever this happens to finish up at. The hole may then be drilled through it, and the nut, with a good thick Hallite washer interposed between the two, will form a sound airtight joint. The outside surface of the tab, should of course, be filed to match as nearly as possible the outer radius of the ring flange,

The Dome

Back we come to the casting story, with its holding problems once more. This is a different story for a number of reasons, but not likely to be as troublesome as the rings. We still have to make the machining of the chucking spigot the first job, and to do this I suggest holding a piece of wood in the lathe, turning it down until the cored interior of the dome casting will just jam firmly on it. This should provide enough grip to allow you to skim up the spigot, but in case of doubt, run a centring drill up the end and support it on the back centre. When this is all done, the casting may be held by the spigot in the lathe chuck, and real turning operations begun. The first thing is to bore the inside to the diameter given, and which is simple enough. The trouble starts when trying to negotiate the domed radius inside, and most inconveniently out of clear vision. One may make up a sheet metal template, but unfortunately it is of little help. You may find out readily enough that it does not fit, but once the template is taken out and the boring tool brought to bear again, fiddling with a couple of slide-rest handles on a purely memory basis usually succeeds in producing nothing more than a series of annoying ridges, or a boring tool suddenly appearing outside the end of the casting, which is definitely both disconcerting and expensive. In point of fact, the inside is not very critical, and so long as clearance is left for the inside dome fitting, no harm will come of it. I think the medium course is the best, especially if you have not got the magician's touch with the lathe handles. To achieve this, bore out the inside as far as it follows a parallel course, as shown on the drawing, and face the end over a short area leaving the desired crown thickness. When this is done, the part left between may be carved away moderately even if it is done tangentially, or in a straight line between the two points, and most of the excessive weight of the dome will be removed.

The outside turning is done on lines similar to those dealing with the chimney, and reference back in these notes should be made. The dome should be driven on to a hard wood mandrel and supported by a centre hole in the end of the spigot, if necessary.

An operation that might be dealt with before this, is that of machining the under swept radius of the dome to match the boiler top radius. I set up a fly-cutter on the milling machine, and held the casting by its chucking spigot, but found that there was a considerable degree of top-heaviness or overhang, and did not care to risk the job on the spigot alone. Eventually, I rigged up an embracing wood clamp to hold the casting round its ample middle, and let loose with the fly-cutter without any qualms. But there is always the good old half-round file in an emergency, and a Sunday afternoon that is not too hot!

Next comes the admittedly tedious work of filing all round the skirt to as nearly as possible, a knife-edge. The root radius of a dome spoils nine out of ten—without any exaggeration whatsoever. Some people get trouble with the file suddenly going over the thin edge, and spoiling it. There is a simple remedy or safeguard against this. If the under radius has been machined or otherwise cleaned up, take a piece of sheet brass and bending it to match the radius—like a sort of dummy boiler top section, solder the dome to it, all round. If the casting is held in the vice by the wood mandrel that should still be left in place, this can be turned round little by little to give a good filing position, and the temporary extra brass "skirt" will prevent the file doing horrible things to the thin edge. Try it; it works like a charm. Assuming you have finally got the fitting to the desired shape, the false skirt may be taken off, the dome replaced in the lathe (using a new wood mandrel if necessary), the spigot removed and the hole and spot face put in the crown.

Blind Man's Check

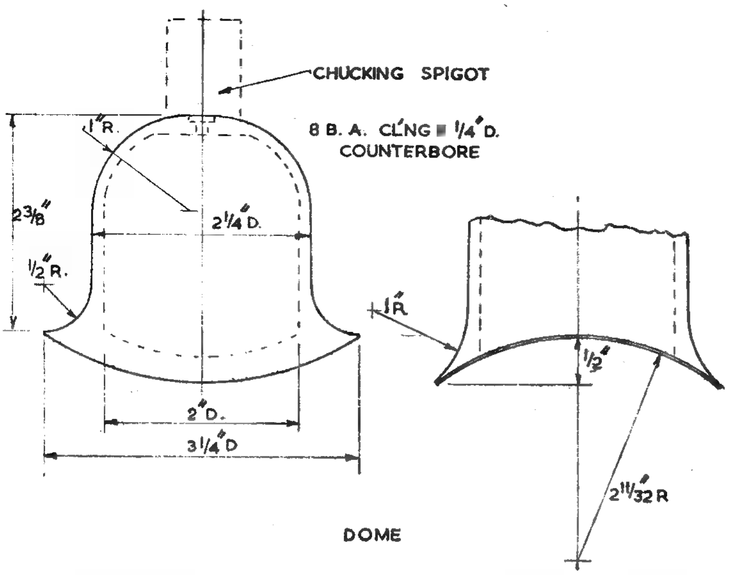
Here is another little tip that perhaps you do not know. When a dome has been shaped with the utmost care; held up to the light and its profile studied from every angle, you may still be in doubt about its authentic shape. For one thing, a bright brass dome never looks the same as one painted black, and for another, the eye does not always detect slight irregularities on a bright metal surface, *but the sense of feel may do so.* I like to shut my eyes and run my fingers round the outside of a fitting, and invariably discover all sorts of bumps and hollows that had escaped visual detection.

You may think this is overdoing things a bit, but believe me, after nearly thirty years in engineering, I have come to the conclusion that it is often the small flaws in fine mechanical parts that show up badly. As for the colour of the bright metal, has it ever occurred to you that to paint the part in dull paint, or even smoke it over a candle flame, takes a few moments to carry out to try the effect, and takes no longer to wipe off when the test is completed?

Safety-valve Casing

Looking at the drawing, one might imagine this fitting to be made out of sheet metal—pressed, in fact. It is not insuperably difficult to turn metal parts to leave thin walls, especially in a straightforward part like this. An off-cut of phosphor bronze or brass rod might

Continued from page 454, October 15, 1953.



DOME

be used, turning out the inside first, and then soldering it by the base flange to another piece of metal for the outside turning; I like this method very much—no dents, no chuck marks, no distorting. The two holes through which the safety-valves will emerge, could to advantage be left undersize until the valves are actually fitted; you might be a shade out in your centres, and it takes only a few minutes with a smooth round file to enlarge and draw over the holes as required, finishing off if necessary with the exact size reamer.

Since I told you that the running boards might be dealt with, I have remembered a more urgent need, so let us dispose of it first. Assuming the boiler has been tested, and everything is in order, the cleading and lagging should be started and tried on. An old pair of flannel trousers or some very thin felt is as good as anything. Cut out a piece long enough to cover the boiler barrel, not forgetting that some of it goes inside the smokebox ring. Make it to come round and butt join underneath, cutting a hole for the dome to project through, and tack the edges together with thread. The metal lagging that goes on top, should be in three pieces. The centre strip should have the hole for the inner dome to come through, made a nice close fit and exactly in the middle. The two ends should meet underneath and lap by about $\frac{3}{8}$ in. The width of this section should be 4 in., the front section, $3\frac{5}{8}$ in., and the back section 3 in. The centre section should be assembled first and the other two afterwards.

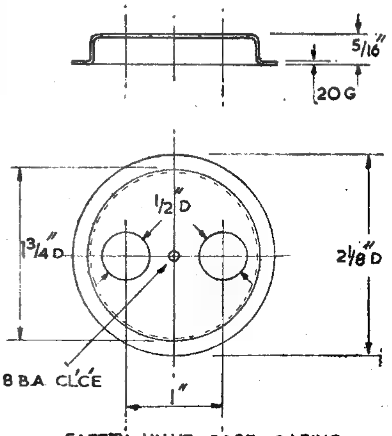
The joints should be covered with a very thin banding, $\frac{1}{4}$ in. wide, one going right at the front, next to the smokebox ring and covering the short flange that projects from it. Two more covering the middle joints, and one next to the firebox. Do not fix any of the lagging just yet, but when the boiler position is finally established, set up a scribing block on a piece of plate or a straight edge, laid along the running board brackets and the buffer beams, and pick up the centre line of the hole drilled in the smokebox to take the handrail knob. Lower the scriber point by 1/32 in. exactly, and scribe a line along the lagging of the boiler at a point about 4 in. to $4\frac{1}{2}$ in. from the hole in the smokebox. This will give you the position for the other handrail knob for which the boiler will have to be drilled. The exact centres are $4\frac{3}{8}$ in., and pilot holes should be drilled right through the lagging and the boiler shell on each side. Take care that the lagging metal is quite tightly drawn round the barrel when this is done.

The lagging may now be removed and the holes in the boiler opened out to $\frac{1}{4}$ in. Make up a couple of blind bushes, tapped 4 B.A. by about $\frac{3}{8}$ in. deep. These may either have a thread on the outside, tapped into the boiler and made good with soft-solder, or left plain and silver-soldered. Plain bushes should have a very slight shoulder left on them, to prevent their dropping inside the shell.

The holes in the lagging sheet need opening up for 4 B.A. clearance only. The blind bushes are a great advantage in that the knobs may be removed at any time without starting mild, but unsightly leakages. The two sets of knobs would be different in shank lengths; those going on the smokebox itself being $\frac{3}{8}$ in. from the base to rail centre, and the boiler knobs $\frac{1}{2}$ in. The rails should be made on the same lines as the one described for the smokebox front, and carrying the little caps at each end.

The firebox lagging is a more difficult job. Here we have to make up a sort of false throatplate, made from quite thin copper sheet, and not entirely embracing the whole boiler circumference. A moment's reflection will show that a complete plate with a boiler barrel hole in it, would not pass the dome, and in any case, all we need to do here is to take the lagging well down below the level of the side tank tops. It all boils down to a false throat plate, cut off from its midway line downwards, leaving a half plate resting saddle-fashion on the top half of the barrel. This sort of plate can easily be knocked over a hardwood block, and provided that the thrown-over flange does not try to run too far round the corner, the thin copper will dress round without much bother. You may find the metal requires very frequent annealing compared with the thicker sheet if puckers and folds are to be avoided, but as the thin gauge is heated and quenched so quickly and easily, it will take very little time to do. The exact shape of the plate will depend on how closely you wish to adhere to the prototype. By this I mean the inclusion of four wash-out plugs—two each side, which project inwards by about $\frac{3}{16}$ in. for which space must be allowed.

(*Continued on page 528*)



SAFETY VALVE BASE CASING

Model Power Boat News

BY MERIDIAN

END OF THE REGATTA SEASON

THE final regattas of the 1953 season were held on successive Sundays by the Blackheath, Kingsmere and Southend clubs. Good support was forthcoming for all of these regattas, both in competitors and spectators, and this is in accordance with practically all the model power boat events this season. One cannot help wishing that our summer lasted a little longer, so that the regatta programme could be spaced out a bit more. However, the enthusiasts seem to turn out on every possible occasion, and there is no doubt that the regattas held in the various parts of the country all help to popularise the hobby.

Blackheath Regatta

This was the eighth annual regatta to be held by the Blackheath M.P.B.C., and it attracted a record entry, especially of free-running craft. The Princess of Wales pond is not a large stretch of water, but offers reasonable facilities for a regatta, and usually is quite good for speed, owing to the shelving banks. On this occasion, speeds in the racing events were not sensational, with the exception of the Class "A" race, which provided the largest entry, and the best speeds of the day.

The entry for the Nomination and Steering events was large, and about 40 boats of all sorts and sizes took part. The winner of the Nomination Race was J. Slender (Welling) with *Sarah Ann*, with an error of only 0.05 sec. and the place winners were also close to the nominated times.

The Steering event went to the St. Albans Club, Mr. Loe scoring 13 points with the steam launch *Emmie*. J. Chandler (Southend) ran two boats, and succeeded in taking both second and third places after a tie with A. Rayman (Blackheath). On the re-runs, Mr. Chandler scored bulls with both boats, while Mr. Rayman could not do better than an inner.

Nomination Race 50 *yd.*

(1) J. Slender (Welling), *Sarah Ann*: 0.05 sec. error.

(2) D. Saunders (St. Albans): 0.5 sec. error.

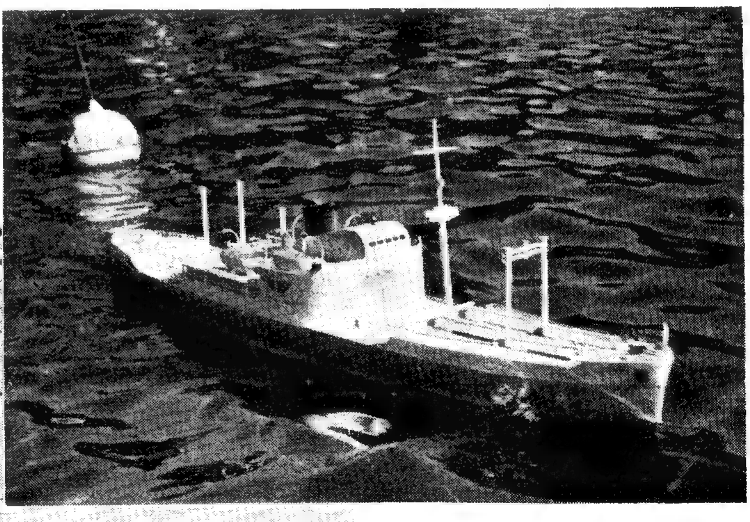
(3) A. Clay (Blackheath), *Elizabeth*: 0.3 sec. error.

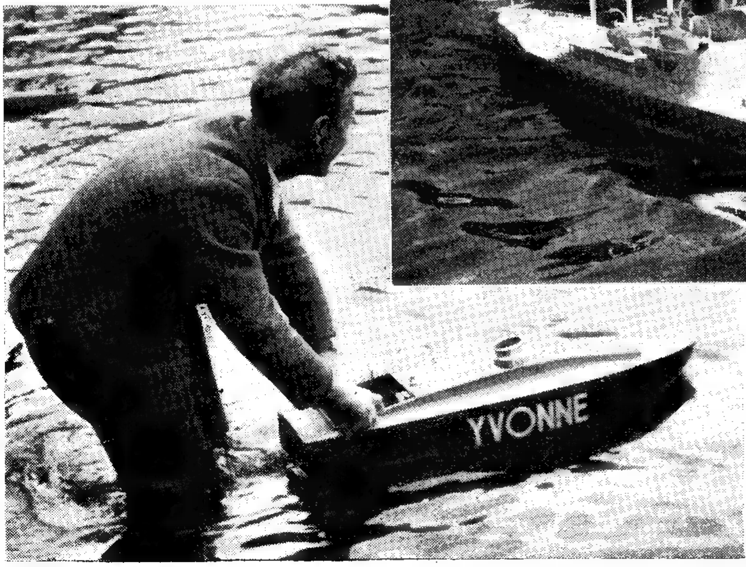
(*Results by per cent. error*)

"*C*" *Restricted Race*, 500 *yd.*

(1) K. Hyder (St. Albans), *Slipper* 4: 53.55 m.p.h.

(2) W. Everitt (Victoria), *Nan III*: 50.13 m.p.h.





Above: The steam-driven cargo liner "Doris," by Mr. H. Dowling (Southend) exemplifies modern tendencies in ship design

Left: Mr. A. Rayman's "Yvonne (Blackheath) one of the most efficient and consistent boats in straight-running events

due co-operation of the S. London Club. It is a great pity that the Kingsmere Club should be handicapped by lack of a pond, as the club made remarkable progress when founded soon after the war, and attained a strong membership. At the moment, the club membership is not as numerous as at one time, but it was determined to hold the usual regatta, which, of course, was the usual success!

In accordance with the local regulations, the speed events were run first, and races in the four classes were on the programme. Speeds in general were well up to average, although the water was not as calm as at the recent S. London regatta, when some new records were set up.

The Victoria Club made a clean sweep of the Steering event, with boats in first, second and third places. The winner was G. Jones with *Fidelis*, with Ted Vanner and J. Skingley as the place winners.

J. Slender (Welling) repeated his success of the previous week by

The only boat with a pilot aboard!—Mr. W. Blaney's "Lil' Man"

Class "C" Race, 500 yd.

(1) R. Phillips (S. London), *Foz* 2: 53.83 m.p.h.

(2) B. Miles (S. London), *Dragonfly* 3: 45.45 m.p.h.

Steering Competition

(1) Loe (St. Albans), *Emmie*: 13 points

(2) J. Chandler (Southend), *Iope I*: 11 + 5 points.

(3) J. Chandler (Southend), *Iope II*: 11 + 5 points.

Class "B" Race, 500 yd.

(1) R. Cluse (Orpington), *Crack o' Dawn II*: 44.08 m.p.h.

(2) G. Lines (Orpington), *Sparky III*: 42.97 m.p.h.

Class "A" Race, 500 yd.

(1) J. Benson (Blackheath), *Orthon*: 63.16 m.p.h.

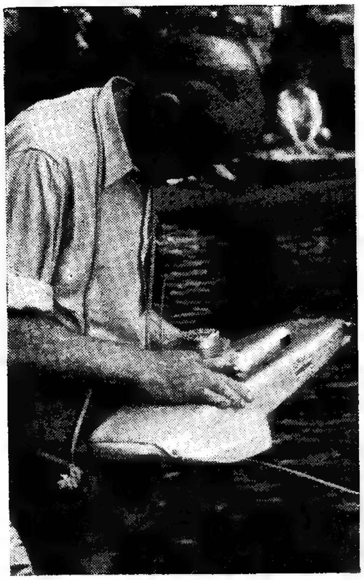
(2) N. Hodges (Orpington), *Rita*: 61.61 m.p.h.

(3) E. Clark (Victoria), *Gordon* 2: 56.82 m.p.h.

Kingsmere Regatta

The Kingsmere M.P.B.C. have not yet managed to locate a new water, so the annual regatta had to be held at Brockwell Park, with the

Fuelling in the modern manner by Mr. K. Hyder (St. Albans) with "Slipper 4"



The new " A " class boat " Rita," by Mr. N. Hodges (Orpington) shows promise, despite first season teething troubles

winning the nomination race—again with a very small error. Messrs. Curtis and Squire, of the home club, were second and third respectively.

" C " Restricted Race, 500 yd.

(1) K. Hyder (St. Albans), *Slipper* 4: 56.19 m.p.h.

(2) W. Everitt (Victoria), *Nan* 2: 54.11 m.p.h.

Class " C " Race, 500 yd.

(1) R. Phillips (S. London), *Foz* 2: 60.88 m.p.h.

(2) B. Miles (S. London), *Dragon-fly III*: 53.83 m.p.h.

Class " B " Race, 500 yd.

(1) J. Bamford (Aldershot), *Jab* 3: 47.79 m.p.h.

(2) G. Lines (Orpington), *Sparky* 3: 45.25 m.p.h.

Class " A " Race, 500 yd.

(1) J. Benson (Blackheath), *Orthon*: 63.92 m.p.h.

(2) E. Clark (Victoria), *Gordon* 2: 59.46 m.p.h.

Nomination Race

(1) J. Slender (Welling), *Sarah Ann*: 2.5 per cent. error

(2) F. Curtis (Kingsmere), *Korongo*: 3.4 per cent. error.

(3) A. Squire (Kingsmere), *Comet III*: 3.8 per cent. error.

Steering Competition

(1) G. Jones (Victoria), *Fidelis*: 11 points.

(2) E. Vanner (Victoria), *Leda III*: ■ points.

(3) J. Skingley (Victoria), *Josephine*: 7 points.

Southend Regatta

This was the second open regatta to be held by the Southend Club, and this year there was ■ full programme of events, including circular-course racing. The pond at Southchurch Park is a very fine one, but suffers badly from the growth of weed, and the club members had to spend most of the previous day in clearing the course.

The Steering competition provided something of a sensation when the second boat to run scored ■ maximum of 15 points. The competitor thus to achieve the hat trick was J. Innocent, (Victoria) with the small i.c.-engined launch *Betsy*. After this shock, everyone tried very hard indeed to emulate the performance, and bulls were plentiful. Nobody succeeded in equalling the score, but Mr. Fawcett (Forest Gate) scored 13 points, and A. Rayman (Blackheath) tied with J. Chandler (Southend) for third place, by scoring 11 points each. On the re-run, the former competitor was successful.

Nomination Race

(1) H. Dowling (Southend), *SO*.1: error 0.18 per cent.

(2) J. Innocent (Victoria), *Betsy*: error 1.77 per cent.

(3) Mapplebeck (St. Albans), *SA*4: error 2.08 per cent.

" C " Restricted Race, 500 yd.

(1) W. Everitt (Victoria) *Nan* 2: 65.14 m.p.h.

(2) W. Everitt (Victoria), *Nan* 3: 55.58 m.p.h.

Class " C " Race, 500 yd.

(1) R. Phillips (S. London) *Foz* 2: 56.78 m.p.h.

Steering Competition

(1) J. Innocent (Victoria), *Betsy*: 15 points.

(2) Fawcett (Forest Gate), *FG*4:

(3) A. Rayman (Blackheath), *Yvonne*: 11 points.

Class " B " Race—None Finished.

Class " A " Race, 500 yd.

(1) N. Hodges (Orpington), *Rita*: 65.56 m.p.h.

(2) J. Innocent (Victoria), *Betty*: 51.65 m.p.h.

TWIN SISTERS

(*Continued from page* 525)

The firebox proper was given top corner radii much milder than necessary, and for this very reason. If the lagging throat plate is set out with say, $\frac{1}{8}$ in. corner radii, the space left between the two along the top edges will allow the plug fittings to be put in, and without making the side lagging sheet bulge out in protest. Apart from this space allowance, a further $\frac{1}{16}$ in. should be left all round for a flannel jacket or other form of insulation.

In giving further dimensions I must be very careful; at this stage of construction it is well possible that your locomotives may be suffering from what is known as "cumulative error." It is not ■ serious matter in the case of upper works, but I feel you should be warned. On my own job I see that the false throat plate comes out at $5\frac{1}{8}$ in. from the centre of the dome, and from the throat plate to the back edge of the firebox lagging is $3\frac{13}{16}$ in. It is at this point that the front spectacle plate butts hard up. It might be a good plan to cut your final lagging sheet with ■ bit to spare, for it is ■ relatively easy matter to shorten it later if necessary.

The ideal way (as far as I am concerned) of joining the firebox lagging to the false throat plate, is to silver-solder it right round the edge; ■ band goes over the join and the lagging sheet continues right down to fasten to the copper strip brazed to the firebox side for boiler rear support. This allows ample room for felt or cloth lagging, and provides a very neat finish to the job. The bands also go right down and may be held, together with the lagging, by two or three small brass or gun-metal studs, drilled and tapped into the rail.

When blind bushes have been fitted and the cloth lagging has been sewn in place for good, the metal sheets may be replaced, picking up the handrail knobs and spacing out all the parts neatly. The bands, carefully turned over at the ends and fitted with 10-B.A. bolts and nuts may be tightened, and the lagging which is almost sure to bulge out between the bands, may be held down with the end of ■ piece of wood, and thoroughly soft-soldered down their comfortably lapped length. The front section of the lagging should, like the front band, go over the collar left at the back end of the smokebox ring, and this alone serves to give ■ completely airtight joint. At this stage, the free length of pipe running from the wet header may be cut to length, shaped, and fitted with its union to match the snifting valve.

(*To be continued*)

READERS' LETTERS

● Letters of general interest on all subjects relating to model engineering are welcomed. A nom-de-plume may be used if desired, but the name and address of the sender must accompany the letter. The Managing Editor does not accept responsibility for the views expressed by correspondents.

IGNITION PHENOMENA

DEAR SIR,—I was interested by Mr. Curwen's letter about the oiling up of sparking-plugs. Perhaps my suggestions may be of interest also.

Due to the violent disturbances in the cylinder of an i.c. engine, very small droplets of oil will be suspended in the explosive gas mixture. Such droplets usually carry a small electrical charge, the sign of which depends on the conditions in which the droplets are formed. Let us assume that the majority of them carry a negative charge. In this case, if the plug becomes positive to the earthed cylinder during ignition, oil droplets will collect on the insulated electrode of the plug; if the electrode becomes negative to cylinder, fewer will collect. If, on the other hand, positively charged droplets are strongly in the majority, oiling up will occur if the plug becomes negative.

It must be remembered that the polarity of the spark depends on the internal wiring of the coil, as well as on the battery connections. A battery with its negative terminal earthed may excite the coil to make the insulated plug electrode negative to earth (and cylinder).

Yours faithfully,

Cardiff. B. TROTT.

A MYSTERY SOLVED—(OR IS IT ?)

DEAR SIR,—The photograph of the strange piece of machinery submitted by Mr. H. W. Ingram and published on p. 382, September 24th, 1953, interested me very greatly, as the original was actually made by my grandfather, and I have three more of them in my workshop now, exactly similar. Grandfather invented the device in 1892 and provisional patents were taken out in 1893. He began by making a few for his friends, and they proved so successful that in 1894 he took over a disused grappling-iron mill at Dorking and produced them in quite a big way. How well I remember his telling me how he employed four boys to scrape the vee-slides at 3s. 6d. per week ! The name of one of those boys was Herbert Thump, who later grew up to throw the G.W.R. bridge across Cricklewood Broadway.

I did not know that any of the machines were still in existence until I saw the picture, although I believe my grandfather made many hundreds of them before he finally went bankrupt in 1895.

As to what it is and how to use it, my grandfather only claimed to be a brilliant inventor and was not a practical man; as far as I know he never got around to finding any use for it. I should mention, however, that they make excellent doorstops; one of mine is at present employed in propping open the door between my workshop and the padded cell.

Yours faithfully,

London, S.W. MICHAEL OXLEY.

A MECHANICAL MYSTERY ?

DEAR SIR,—With reference to the letter by Mr. H. W. Ingram, of Dublin, which appeared on page 382 of the September 24th issue, I think the drawing shown herewith will explain the mystery. It is taken from *The Watch and Clockmaker's Handbook*, by F. J. Britten, published by Messrs. E. and F. Spon in 1896, and depicts Boley's Horizontal Driller, which was much used in the watch and clock industry at that time, and is still used by "old-timers" today. It has much to recommend it for fine and delicate drilling of small parts.

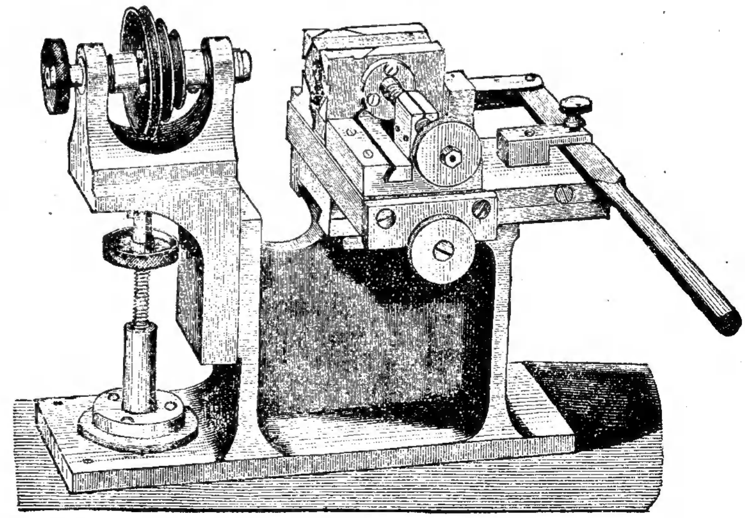
The description of the appliance in the above book reads: "This is furnished with an exceedingly well-designed vice for holding objects to be pierced; it has long angular jaws so that a piece of wire can be instantly gripped with the assurance that it is in line with the drilling spindle. There is a circular sink on the face of the vice and another on the top for holding discs to be perforated either through the face or the edge. Having clasped the work in the vice, the centre of the drill can be brought to any spot, by means of a screw to adjust the height of the headstock and a slide rest to traverse the vice."

Your correspondent's model, probably by a different maker, is in essentials exactly the same, but is incomplete, the headstock, with drilling spindle, and lever arm being missing. If any further information is required, I should be pleased to help, or he could probably obtain a copy of the book from the local public library.

Yours faithfully,

Welling. C. N. CODD.

[We have received several other letters from readers confirming the above information, and take this opportunity of acknowledging their helpfulness in this matter.—ED., "M.E."]



UTILITY STEAM ENGINES

DEAR SIR,—Your remarks in the issue of September 10th on the difficulty of precise adjustment of the length of slide-valve spindles, prompt me to describe one or two methods I have devised to meet the point.

In Fig. 1 a ball is screwed, driven, or otherwise firmly secured at, or near the end of the spindle and this sits, a nice fit, in a blind hole drilled in the back of the valve, concentric with the slot for the spindle. The endways adjustment is made by screwing the spindle into or out of the valve crosshead and locking it with a nut. Very precise adjustment is possible.

The disadvantage of this method is that it necessitates a valve-chest somewhat deeper than usual.

In Fig. 2 the " waist " in the valve spindle is turned, the dimension "X"

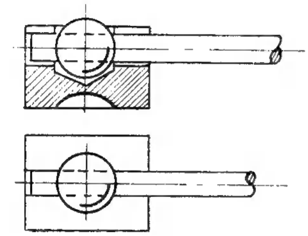


Fig. 1.

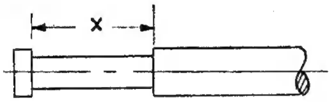


Fig. 2.

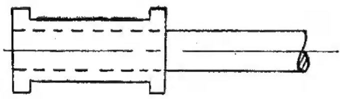


Fig. 3.

being a nice fit on the back of the valve, the slot in which is just wide enough to accommodate the reduced portion.

This method weakens the valve-spindle, but I have made a number like this for " O " gauge steam locomotives where the spindles are 3/32-in. stainless-steel turned down at the waist to $\frac{1}{16}$ in.—a tricky job. I have never had one break in service.

Fig. 3 illustrates the same idea, but in this case a small circular bobbin is driven, screwed or otherwise firmly secured on the end of the valve-spindle.

I have never used Fig. 3, but have used 1 and 2, and with these it is possible to get very regular beats.

Yours faithfully,

Birkenhead. A. E. HEPWORTH.

SHOWMAN'S ROAD LOCOMOTIVES

DEAR SIR,—" Talking About Steam," in your issue dated September 3rd, contains an illustration of Fowler showman's road locomotive No. 15658 which is described as " the only one of this make fitted with separate exciter."

This statement is incorrect, as numerous Fowler road locomotives had exciters mounted on top of the belly-tank (offside), for use with electric scenic railways. The drive from the dynamo was similar to that on Foster and Burrell engines except that it was diagonal, and many showmen preferred this location from an accessibility and temperature point of view.

As Mr. Hughes states in his article, No. 15658 was the only engine made by Fowler's with exciter between cylinders and chimney.

Yours faithfully,

Bolton. M. C. B. ARTHUR.

DEAR SIR,—I am greatly obliged to Mr. Arthur, who may fairly be regarded as an expert on all matters appertaining to the fairground, for pointing out the omission in the caption to the photograph of Fowler No. 15658. Had this concluded with the words " . . . . between cylinders and chimney," it would have been correct, as was the article itself.

Perhaps I should have mentioned in the latter that some Fowlers were fitted with exciters mounted on the belly tank, but owing to considerations of space one cannot always include all the information one would like.

Incidentally, I hope to deal later on with the showman's electrical systems (steam-driven only !), and would be glad of any photographs or information from readers, to supplement my own notes and research.

Yours faithfully,

Sheffield. W. J. HUGHES.

A ROTATING BRAZING HEARTH

DEAR SIR,—I was very interested in Mr. A. L. Primavesti's article on the above subject. It has occurred to me that a very similar piece of equipment could be made if one half of a car rear axle was obtained and stood on end, the brake drum being reversed to form the hearth.

Yours faithfully,

Roche. J. TRETHEWEY.

THANKS TO "M.E." READERS

DEAR SIR,—Many thanks for your kindness in publishing my appeal for old copies of THE MODEL ENGINEER or other model books; the answer to it has been overwhelming. I have had so many letters and parcels, many of which did not contain the address of the sender, so I would like to take this opportunity of thanking them all. The books have certainly taken my mind off my trouble, as the operation was not a success; still, I keep smiling, and potter about at model engineering whenever I can. I think it is a wonderful hobby, and certainly model engineers are a wonderful and friendly fraternity. I have not written before, as I have been away for a rest, hence the delay; so again giving my grateful thanks to all.

Yours faithfully,

Norwich. O. WOOLDRIDGE.

MODEL CAR BUILDING

DEAR SIR,—Mr. Deason's comments on what he so aptly describes as a " curious contradiction " in the model car movement certainly calls for an attempt to remedy the position, and in order to do this we must review the whole past history of the movement to find where we have gone astray.

With the sole exception of the Aeromodeller competition, the model car movement started with model car *running* (not racing).

At this time it attracted model engineers from other spheres, and the emphasis was on *building* a car. With the inception of racing, however, certain people found an easy way to success by using American engines.

Now, I have nothing against the use of commercial engines or racing, but I do want to make the point that these factors have become predominant, to the exclusion of the purely model engineering aspect.

It has been remarked at Pioneer Club meetings in the past that a meeting where no competition was run off had quite a different atmosphere from a race meeting.

I feel that I am right in saying that the continued enthusiasm of the North London Society's Car Section, is due to the absence of competitions, and hereby invite anyone interested in *building* model cars and running them in a non-competitive and congenial atmosphere to come along to St. John's Hall, Friern Barnet Lane, Whetstone, when next the Car Section is holding a meeting.

Yours faithfully,

London, N.W. A. F. WEAVER.

Silencing a HIPP CLOCK

By H. G. Sharpe (Argentina)

IN the article "Bedroom Horology," which appeared in THE MODEL ENGINEER of 10/1/52—to which happy title the writer does not lay claim—it was stated that the clock described therein was fairly silent.

This was true normally, but for some time the writer was troubled with intermittent spells of insomnia, and on these occasions the noise of the "TUK-tuk" of the clock seemed to be quite loud. Not only was this so, but counting the seconds between impulses was becoming a habit. This counting was the more intriguing in that, as the impulse beat was silent, it often escaped notice, in which case counting went on to 38 or 57 or perhaps more, as 19 sec. usually elapsed between impulses. Something had to be done to silence the clock.

On watching the clock at work, it appeared that the noise was due rather to the amplitude of the swing of the trigger than to its weight, and that if this could be reduced, the "TUK-tuk" would be quieter. The trigger is one inch in length, made of a piece of clockspring, waisted for most of its length, and is $\frac{3}{16}$ in. wide. Its business end is sharpened somewhat. It engages in a notch 1/50 in. deep in the trip block.

Some nine months ago a series of experiments were begun, and some of these might be of interest to readers.

(*a*) All oil was cleaned from the trigger suspension pin. This reduced the swing of the trigger, and also the noise. This could not, of course, be considered a practical solution, so the trigger was oiled again.

(*b*) Thin paper vanes were stuck to the trigger, but the largest of these which could be accommodated had no appreciable effect.

(*c*) The trigger was magnetised. It was reasoned that attraction between the trigger and the steel trip block would lessen the impact much more than it would increase it. This proved to be the case, but the diminution of noise was not nearly enough to satisfy the investigator, who toyed with the idea of making a trip block which could be magnetised. This was not done, as it appeared to be almost a certainty that an impulse would be given at every swing of the pendulum to the right-hand.

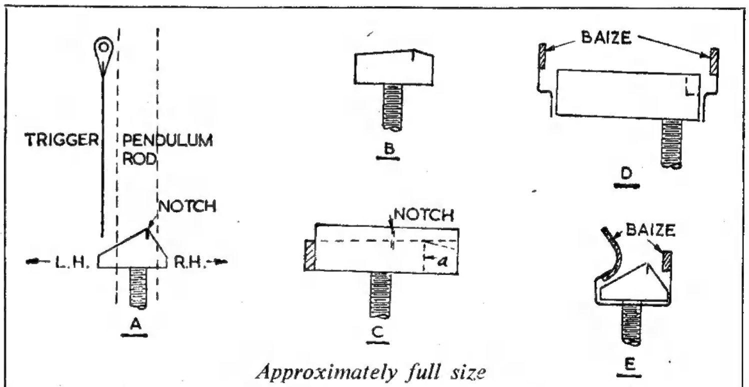
(*d*) Two coats of a rubber solution were given to the working faces of the trip block. This was much the most satisfactory result yet obtained, but in six or eight weeks the coating had worn through altogether. To be sure, a much better material might have been employed had it been thought of and found to be available. Anyway, the idea was given up.

(*e*) A little heavy grease was applied to the trigger blade, and to the notch of the trip block, an artifice this which had been tried some years back. Complete silence was the result, but it only lasted a couple of months, if that long.

Attention was now concentrated on the trip block. The illustration shows, at *A*, the pendulum rod trigger and trip block, as they are when the clock is stopped. It was thought that a trip block with flatter slopes on the working faces would be quieter, so that shown at *B* was fitted. The result was quite negative. This was a nice block, made of steel, but it was also a disappointment.

The next block to be tried was that shown in sketch *C*. This was made of brass, as were all later attempts. It was evident that, if the swing of the trigger were reduced its impact on the block would be lessened. This block was put in the clock, and an estimate formed of the amount of slope which would be required to permit the trigger to clear the l.h. end and still engage with the notch. The top face was then sloped and notched as indicated by the dotted line. On trying it again in the clock, the trigger, once electric contact had been made, simply engaged near the l.h. end then, taking an impulse every time that the pendulum swung to the right, stalked right along the block, skipping the notch in its stride and so causing the pendulum to oscillate violently. To remedy this, and give the trigger an easy entrance at the r.h. end, this end was filed in a curve as shown by dotted line. The result was unsatisfactory, so the r.h. end was cut off to line *a*. This done, and a rubber pad fitted as shown, the "TUK-tuk" became much quieter.

As a result of the foregoing trials, *D* was made, and, to the great satisfaction of the writer, gave an almost silent clock. Not altogether satisfied, the detents shown were fitted and, to reduce the amplitude of swing of the pendulum, the piece indicated by dotted lines was cut away. This certainly reduced further the noise but, for some reason which was not investigated, the clock took to stopping. It might go for hours, but it stopped three times, and each time the electric contact remained closed. This caused heating of the transformer and electromagnet. In view, therefore, of the risk of fire, the silent block was discarded, but not the idea of the detents.



Approximately full size

The final result of all the attempts is shown at *E*, made in desultory fashion over several months, to achieve silence. In this the original block has been reinstated, but now fitted with a shield or detent made of sheet brass to which are attached pads of baize, as shown. This

(*Continued on next page*)

QUERIES AND REPLIES

" THE M.E." FREE ADVICE SERVICE. Queries from readers on matters connected with model engineering are replied to by post as promptly as possible. If considered of general interest the query and reply may also be published on this page. The following rules must, however, be complied with:

(1) Queries must be of a practical nature on subjects within the scope of this journal.
(2) Only queries which admit of a reasonably brief reply can be dealt with.
(3) Queries should not be sent under the same cover as any other communication.
(4) Queries involving the buying, selling, or valuation of models or equipment, or hypothetical queries such as examination questions, cannot be answered.
(5) A stamped addressed envelope must accompany each query.
(6) Envelopes must be marked " Query " and be addressed to THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.

Cutting Circular Hole in Glass

I wish to cut a circular hole in a window pane, in order to fit a Vent-Axia type of ventilating fan, but have broken several panes of glass in the attempt. Can you give me any advice on this matter?

D.J. (Worcester).

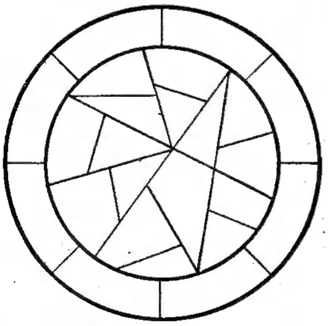
This job is always attended by a certain amount of risk, and even professional glaziers are not always successful the first time.

It seems probable to us that you have been attempting to cut a plain circle, breaking the glass along the cut by tapping, and then attempting to remove the circular centre-piece. It is almost impossible to do the job this way, owing to the glass keying.

We take it that you have some form of swinging arm upon which the glass-cutter can be mounted.

It is important that the glass be placed upon a level table, preferably padded with an old blanket, to provide some cushioning effect. Now proceed as in the accompanying sketch.

First, with the swinging cutter, scratch a circle about two inches less in diameter than the required size. Now re-adjust the radius and scratch a circle of the correct size.



The swinging arm may now be removed, and a series of cuts made across the inner circle, in the manner shown. Now, divide the outer ring into a series of segments, taking great care that the scratches do not run outward past the outer ring. Using light taps with the glass-cutter, endeavour to crack through and remove one of the irregularly shaped inner pieces, and when this is done, tap and remove the remainder.

This leaves a circular hole, and, proceeding in a like manner, the segments of the outer ring should be removed, tapping the glass along the line of cut, and breaking out the segments with a pair of pliers.

We would emphasise that all grease and dirt must be cleaned from the glass before starting operations.

Turning Stainless-steel

I intend to build a model locomotive, and am toying with the idea of making certain of the parts in stainless-steel, but I have been almost frightened off by reports of the difficulty of working this material. As stainless-steel seems to be used extensively in industry with apparent success, I am wondering if the difficulties have been exaggerated, or if there is any special technique required.

T.M. (London, E.2).

The idea that stainless-steel is difficult to work is really a legacy from the early days when this material was being developed, and there are now on the market stainless materials which are as easy to machine as mild-steel. The grades known as D.T.D. 572, K.E. 40A, and S 61, are particularly free-cutting, and will produce a high finish, and all of these may be obtained from established metal merchants.

It is necessary, however, that the cutting tool be kept really sharp, as stainless-steel must be cut and not rubbed. Rubbing tends to harden the surface. Tools of " Stellite " or some similar material may prove helpful, but tungsten carbide tools can rarely be kept sharp enough, or ground to suitable shape. As a cutting lubricant, use sulphurised oil or carbon tetrachloride. Speed should be about the same as for mild-steel, or even slightly higher.

Brazing Small Parts

I have recently made some tipped boring tools by brazing small pieces of high speed steel to mild-steel shanks, but have had great difficulty in holding the tips in place during the brazing operations. I have tried binding the tips in place with steel florists' wire, and also copper wire, but have found that both of these burn away before the job is hot enough for brazing. In consequence, the tips fall off or become displaced when the tool is lifted from the hearth for quenching and hardening in a salt water bath. Can you advise as to a method of securing the tips?

L.A.T. (Beccles).

Small parts can be held together when brazing by a binding of resistance wire such as is used for the elements of electric fires, and this will not burn away at brazing temperatures. Suitable wire may be bought from Woolworth's stores, where it is sold as replacement elements.

We also note your remarks about quenching in a salt water bath, and would point out that this method of hardening is not suitable for high-speed steel. This should be hardened either by cooling in an air blast, or by plunging into a bath of whale oil. Failing these, we have obtained good results by quenching in ordinary soluble cutting oil, mixed with water in a proportion of about one of oil to three of water.

Silencing a HIPP CLOCK

(*Continued from previous page*)

arrangement, which should have been obvious from the beginning, effectually limits the travel of the trigger and renders the clock so silent that it is inaudible to the writer at a distance of 13 feet, that is to say when he is in bed. The l.h. end of the detent has to be as long as shown, to avoid escape of the trigger over its end, and care must be taken to insure that sufficient space is left to prevent jamming of the trigger between the detent and the block when the pendulum swings to the right hand.

The present arrangement has now been in use for some six weeks; there is no appreciable wear of the baize pads and, better still, counting of the number of seconds between impulses is impossible at 3.0 a.m., when one should be asleep.

The sketches are reproduced approximately full size.